

HOW TO USE THIS DOCUMENT:

New buildings and buildings undergoing major renovations (those larger than 7,500 square feet whose heating, ventilating and air conditioning (HVAC) systems are being replaced) must comply with the [Maryland High Performance Buildings Act](#).

This document sets prohibitions and minimum requirements for HVAC equipment procured by the State of Maryland with which Contractors are required to comply. Contractors are required to follow and, when possible, exceed these standards in their product offerings to the maximum extent practicable where such products are cost competitive over the total lifecycle, and meet form, function and utility requirements.

This document also includes additional environmentally desirable attributes that Contractors are encouraged to meet or exceed, to the maximum extent practicable, and meet form, function and utility requirements. Environmentally desirable practices are also described.

PRODUCTS COVERED UNDER THIS SPECIFICATION:

Cooling

- Air Conditioners
- Chillers

Heating

- Boilers
- Furnaces
- Heat Pumps
- Water Heating Equipment

Fans and Ventilation Systems

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1. ENVIRONMENTALLY PREFERABLE PURCHASING: LEGISLATION, STATUTES, AND REGULATIONS

For Procurement Officers and Agencies

Environmentally Preferable Purchasing (COMAR: [21.11.07.09](#))

“All procurement agencies shall purchase environmentally preferable products and services unless purchasing environmentally preferable products and services would limit or supersede any requirements under any provision of law or result in the purchase of products and services that:

- (1) Do not perform adequately for the intended use;
- (2) Exclude adequate competition; or
- (3) Are not available at a reasonable price in a reasonable period of time.”

Mercury and Products that Contain Mercury (COMAR: [21.11.07.07](#))

“All procurement agencies shall give a preference under this regulation to procuring products and equipment that are mercury-free. If mercury-free products and equipment that meet the agency's product performance requirements are not commercially available, the procurement agency shall give preference under this regulation to products containing the least amount of mercury necessary to meet performance requirements.”

Efficient Product Purchase Goal ([Executive Order 01.01.2001.02](#))

“The State shall purchase ENERGY STAR products when purchasing energy-using products, including computers, printers, copiers and other office equipment, or shall purchase products in the top 25% in energy efficiency for products where labels are not available.”

Low Noise Emission Products (State Finance and Procurement Article [§14-403](#))

“To the extent practicable, each unit of the State government shall buy or lease for use by the State government supplies that are the quietest available supplies. Supplies that are certified as low-noise-emission products under the federal Noise Control Act of 1972 are considered to meet [this requirement].”

On the Use of Biodiesel Fuel (State Finance and Procurement Article [§14-408](#))

“‘Biodiesel fuel’ means: (1) a fuel, comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, that is designated B100 and meets the requirements of ASTM D 6751 and its successors; or (2) a blend of biodiesel fuel meeting ASTM D 6751 with petroleum-based diesel fuel, designated as BXX, where XX represents the volume percentage of biodiesel fuel in the blend. In fiscal year 2009 and in each subsequent fiscal year, the State shall ensure that at least 50% of the heavy equipment owned by the State using diesel fuel and at least 50% of the heating equipment in State buildings that uses normal or #2 heating oil use, subject to availability, a blend of fuel that is at least 5% biodiesel fuel or other biofuel approved by the U.S. Environmental Protection Agency as a fuel or fuel additive or approved under the EPA Renewable Fuels Standard 2 program.

This section does not apply to any State vehicle, piece of heavy equipment, or heating equipment for which mechanical failure due to use of biodiesel fuel or other biofuel will void the manufacturer’s warranty for that vehicle, piece of heavy equipment, or heating equipment.”

Limitations on Hazardous Substances (Environment Article [§6-1201 et seq.](#))

“A person may not manufacture, process, sell, or distribute in the State a new product or flame-retardant part of a new product that contains more than one-tenth of 1% of pentaBDE (pentabrominated diphenyl ether) or octaBDE (octabrominated diphenyl) by mass.”

“A person may not manufacture, lease, sell, or distribute for sale or lease in the State electrical or electronic equipment that contain more than one-tenth of 1% of decaBDE (decabrominated diphenyl ether) by mass.”

Maryland High Performance Buildings Act (State Finance and Procurement Article [§3-602.1](#))

“The State shall employ green building technologies when constructing or renovating a State building not subject to this section; and (2) high performance buildings shall meet the criteria and standards established under the “High Performance Green Building Program” adopted by the Maryland Green Building Council. “Major renovation” means the renovation of a building where: (i) the building shell is to be reused for the new construction; (ii) the heating, ventilating, and air conditioning (HVAC), electrical, and plumbing systems are to be replaced; and (iii) the scope of the renovation is 7,500 square feet or greater.”

Prohibitions on the Use of Hydrofluorocarbons in Certain End Uses ([COMAR: 26.11.33](#))

Maryland will begin phasing out the use of hydrofluorocarbon (HFCs) refrigerants in certain end uses in 2021 by adopting specific United States EPA Significant New Alternatives Policy Program’s (SNAP) prohibitions derived from SNAP Program Rules 20 and 21.

For Contractors, Bidders, and Offerors

Verifying Environmental Claims (State Finance and Procurement Article [§14-410](#))

“A bidder or offeror for a procurement contract shall certify in writing that any claims of environmental attributes made relating to a product or service are consistent with the Federal Trade Commission’s Guidelines for the Use of Environmental Marketing Terms.”

2. PROHIBITED PRODUCTS

- A. Pursuant to Environment Article §6-1201-1204, products containing more than one-tenth of 1% of pentaBDE, octaBDE, or decaBDE by mass are prohibited.
- B. Pursuant to COMAR: 21.11.07.07, products that contain mercury are prohibited, unless there are no commercially available mercury-free products for a specific application. In such cases, the Contractor must offer products containing the least amount of mercury necessary to meet performance requirements.

The Contractor must clearly label in its bid/proposal all products that contain mercury.

- C. Pursuant to Environment Article §§9-1901-1907, the Contractor is prohibited from offering or using packaging or packaging components (e.g. inks, dyes, pigments, adhesives, stabilizers, and additives) with lead, cadmium, mercury or hexavalent chromium at concentration levels exceeding 100 parts per million by weight or 0.01%.
- D. Equipment employing Chlorofluorocarbon (CFC)-based refrigerants are prohibited.
- E. The use of Hydrofluorocarbons (HFCs) in certain end-uses are prohibited. HVAC system and equipment purchases must comply with Maryland’s HFC prohibitions **effective immediately**.

Please refer to Appendix B for a full list of prohibitions and exceptions.

3. MINIMUM REQUIREMENTS

- Products purchased as part of new building construction or purchased as part of a major renovation must comply with the requirements of the Maryland High Performance Green Building Program.
- For single product purchases (e.g. as part of a retrofit or product replacement), must follow the energy efficiency and product requirements in Section 3.A.I.*
- All refrigerant-using products must utilize low global warming potential (GWP) substitutes approved under the U.S. EPA's Significant New Alternative Policy (SNAP) program.
 - i. High GWP refrigerants (e.g. HFCs) are primarily used in the heating and cooling sectors (e.g. air conditioners, chillers, heat pumps, etc.).
 - ii. SNAP's acceptable refrigerants by end-use can be found at <https://www.epa.gov/snap/snap-substitutes-sector>. These substitutes can also be filtered by Retrofit or New, and sorted by GWP.
- All HVAC equipment must be sized appropriately. As stated in the International Energy Conservation Code (IECC), "the output capacity of heating and cooling equipment shall be not greater than that of the smallest available equipment size that exceeds the loads calculated" in accordance with ANSI/ASHRAE/ACCA Standards (C403.3.1). In addition, "heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE *HVAC Systems and Equipment Handbook* by an approved equivalent computational procedure (IECC C403.1.1)."
- The Contractor must ensure technicians who install HVAC systems and equipment follow original equipment manufacturer instructions and industry-wide best practices.
 - i. For instance, technicians must follow the Quality Installation standards issued by the Air Conditioning Contractors of America when installing air conditioning equipment (<https://www.acca.org/standards/quality>).

* Exceptions may be granted by the Maryland Green Purchasing Committee (GPC) where circumstances of an extreme nature are encountered. Thorough justification of an exception request, including energy usage, performance information, life-cycle costing, and pricing that compares all available alternatives, must be provided with the request. Requests may be submitted to DGS.BuyGreen@maryland.gov

A. Product Requirements

I. Energy Efficiency Requirements*

To the maximum extent practicable, and when the equipment is manufactured and available at a higher efficiency rating than the current code, the following products are required to be 15% more efficient in performance than the standards set by the most recent version of the IECC in effect at the time of purchase. The relevant section numbers from the 2018 IECC are included below, as are the section numbers for the 2021 IECC which are italicized. The IECC tables with the GPC efficiency requirements can be found in Appendix C (2018 IECC) and Appendix D (2021 IECC)

- a) Air Conditioners and Condensers
 - 1. Unitary Air Conditioners and Condensing Units - Electrically Operated (C403.3.2(1))

2. Packaged Terminal Air Conditioners - Electrically Operated (C403.3.2(3)); (C403.3.2(4))
3. Single-Package Vertical Air Conditioners (C403.3.2(3))
4. Room Air Conditioners (C403.3.2(3))
5. Condensing Units - Electrically Operated (C403.3.2(6))
6. Air Conditioners and Condensing Units Serving Computer Rooms (C403.3.2(9)); (C403.3.2(10))
7. *Computer-Room Air Conditioners- Ceiling Mounted (C403.3.2(16))*
- b) Combination Systems
 1. Room Air-Conditioner Heat Pumps (C403.3.2(3))
 2. Combination Warm-Air Furnaces/Air-Conditioning Units (C403.3.2(4))
 3. Warm-Air Duct Furnaces and Unit Heaters (C403.3.2(4)); (C403.3.2(5))
- c) Boilers: Gas- and Oil-Fired (C403.3.2(5)); (C403.3.2(6))
- d) Heat Pumps (C403.3.2(2))
 1. *Variable-Refrigerant-Flow and Applied Heat Pumps (C403.3.2(9))*
 2. Air-Cooled
 3. Unitary and Applied Heat Pumps -Electrically Operated (C403.3.2(2))
 4. Packaged Terminal Heat Pumps (C403.3.2(3))
 5. Single Vertical Heat Pumps (C403.3.2(3))
 6. *Variable-Refrigerant-Flow Air Conditioners (C403.3.2(8))*
 7. *Water-Source Heat Pumps (C403.3.2(14))*
- e) Fans (C403.8.3)
 1. Fractional hp Fan Motors (C403.8.4)
- f) Heat Rejection Equipment (C403.3.2(8)); (C403.3.2(7))
- g) Heat Transfer Equipment (C403.3.2(10))
- h) Warm-Air Furnaces (C403.3.2(4)); (C403.3.2(5))
- i) Water Chilling Packages/Chillers (C403.3.2(7)); (C403.3.2(3))
- j) *Heat-Pump and Heat Recovery Chiller Packages (C403.3.2(15))*
- k) *Vapor-Compression-Based Indoor Pool Dehumidifiers (C403.3.2(11))*
- l) *Hot Gas Bypass Capacity (C403.3)*
- m) *Boiler Turndown (C403.3.4)*
- n) *DX-DOAS Units, Single-Package and Remote Condenser*
 1. *Without Energy Recovery (C403.3.2(12))*
 2. *With Energy Recovery (C403.3.2(13))*

**Energy efficient HVAC systems are eligible for utility rebate programs. Please check with your local utility provider.*

B. Preventative Maintenance, Service, and Repair Requirements for New and Existing Equipment

- 1) Pursuant to EPA regulations found in 40 CFR Part 82, Subpart F, technicians who maintain, service, or repair equipment that may release refrigerants must possess the Section 608 Technician Certification.

- 2) Contractor must ensure HFC and HFC blend refrigerants are captured and reclaimed from existing equipment to reduce the production of new HFCs. Technicians must demonstrate that they have the proper certifications and refrigerant recovery and recycling equipment prior to performing work.
- 3) Contractor is encouraged to use certified reclaimed refrigerant for routine servicing, maintenance or repair.

C. End-of-Life Requirements for Equipment

- 1) Contractor shall notify the State of any available take-back service for reuse, refurbishment, and/or recycling for purchased and previously purchased equipment, including information on how to utilize the service. This information shall be made available to the purchasing State agency at time of purchase through written or online documentation.
- 2) Under EPA regulations at [40 CFR Part 82, Subpart F](#), technicians who dispose of equipment that may release refrigerants must possess the [608 Technician Certification](#). Technicians disposing of a motor vehicle air conditioning (MVAC) system must possess the [Section 609 Technician Certification](#).
- 3) Before disposing of any appliance containing more than 5 pounds of refrigerants, a Section 608 Certified technician must recover the refrigerant to ensure it is not released into the environment. Refrigerants of different types should be separated.
- 4) In accordance with Section 608 of the Clean Air Act, refrigerant recovery and recycling equipment must meet the requirements set forth in [Appendix B2, B3, and B4 to 40 CFR 82, Subpart F](#).
- 5) Contractors must be able to provide evidence of appliance's proper disposal to the State upon request.

D. HFC Tracking and Reporting Requirements

The Contractor shall require subcontractors or technicians to track and report on the amounts of refrigerants, including HFCs and HFC blends, added or removed during routine installation, maintenance, service, repair, and disposal of all equipment, appliances, and supplies.

The Contractor must be able to provide HFC tracking and reporting information to the State upon request.

4. ADDITIONAL ENVIRONMENTALLY DESIRABLE ATTRIBUTES

A. HVAC System Recommendations

The purchase of electric-powered HVAC systems and equipment is strongly recommended as a replacement for fossil fueled systems.

B. Packaging Recommendations

- 1) Where the Contractor uses packaging in addition to manufacturer packaging, the Contractor is encouraged to select packaging that minimizes or eliminates the use of

disposable containers and/or incorporates recycled content and is easily recyclable through the State's contracted recycling programs. The Contractor shall avoid the use of polystyrene foam packaging (e.g., peanuts) and other difficult-to-recycle packaging materials. Where appropriate, Contractor packaging using reusable crates or reusable pallets is preferred over boxed packaging.

- 2) For corrugated cardboard packaging (also known as containerboard packaging), the Contractor is encouraged to use versions that contain a minimum of 25% by weight of post-consumer materials, which is the minimum post-consumer content level for packaging specified by the U.S. Environmental Protection Agency Comprehensive Procurement Guidelines.

C. Shipping/Transport Recommendations

To promote fuel efficiency and reduce greenhouse gases and air pollution, the Contractor is encouraged to use a SmartWay Transport/Carrier Partner for the shipment or transport of products. A list of SmartWay Transport partners can be found here: <https://www.epa.gov/smartway/smartway-partner-list>.

5. MAINTENANCE AND USAGE REQUIREMENTS AND RECOMMENDATIONS

- A. Air Filters must be MERV 13 rated or the highest efficiency level feasible. Contractors should ensure filters are sealed properly to prevent bypass.
- B. HEPA filters and ultraviolet germicidal irradiation (UVGI) can be implemented in higher risk areas.

6. ENVIRONMENTALLY PREFERABLE PURCHASING LANGUAGE

Instruction to Procurement Officers: Please include the following language to your solicitation if it does not already exist.

A. On Environmentally Preferable Purchasing:

The State of Maryland is committed to purchasing environmentally preferable products and services (EPPs). Maryland's State Finance & Procurement Article §14-410 defines environmentally preferable purchasing as "the procurement or acquisition of goods and services that have a lesser or reduced effect on human health and the environment when compared with competing goods or services that serve the same purpose."

Accordingly, Bidders/Offerors are strongly encouraged to offer EPPs to fulfill this contract, to the greatest extent practicable.

B. On Maryland's Green Purchasing Reporting Requirements:

The State of Maryland requires, at a minimum, from the Contractor annual sales data over the life of this contract; the State also reserves the right to request quarterly sales data over the life of this contract.



The report shall include at a minimum, details about the third-party sustainability certifications and other environmental attributes of products and services sold on this price agreement per the contract specifications.

To facilitate consistent reporting on this contract, the Contractor will be provided with a VENDOR GREEN SALES REPORT template from the Green Purchasing Committee (GPC), the Office of State Procurement (OSP) or the Department of General Services (DGS).

C. On Environmental Claims:

All environmental benefit claims made by the Contractor concerning products or services offered on this contract must be consistent with the [Federal Trade Commission's Guidelines for the Use of Environmental Marketing Claims](#).

Appendix A– Definitions

Central Air Conditioner: A central air-conditioner model consists of one or more factory-made assemblies that normally include an evaporator or cooling coil(s), compressor(s), and condenser(s). Central air conditioners provide the function of air-cooling, and may include the functions of air circulation, air cleaning, dehumidifying, or humidifying.

CFC: Chlorofluorocarbon; ozone-depleting substances that were phased out under the Montreal Protocol.

End-of-life management: Process by which products are disposed of after their term of useful service expires.

Energy efficient: Product that performs more work per unit of energy as compared to all similar products.

ENERGY STAR: A joint program of the U.S. Department of Energy and the U.S. Environmental Protection Agency certifies and lists relatively energy-efficient products in several categories such as light fixtures, LEDs, appliances, and office equipment. Product List can be accessed here:
<https://www.energystar.gov/products>

Environmentally preferable: Products and services that have a lesser or reduced effect on human health and the environment when compared to other products and services that serve the same purpose.

Gas/Electric Package Unit: A single package unit with gas heating and electric air conditioning that is often installed on a slab or roof.

Global Warming Potential (GWP): A measure of a greenhouse gas's impact on global warming compared to 1 ton of carbon dioxide (CO₂) over a period of 100 years. Some examples of the use of GWP, as provided by the EPA, include:

- o Carbon Dioxide (CO₂): 1 GWP
- o Methane (CH₄): 28-36 GWP
- o Nitrous Oxide (N₂O): 265-298 GWP

Acceptable alternatives to high GWP refrigerants can be found under the U.S. EPA's *SNAP* program:
<https://www.epa.gov/snap/snap-substitutes-sector>.

Hazardous substance: 1) Material posing a threat to human health and/or the environment, that can be toxic, corrosive, ignitable, explosive, or chemically reactive; or 2) a substance that must be reported to the EPA if released into the environment.

Heat Pump: A heat pump model consists of one or more factory-made assemblies that normally include an indoor conditioning coil(s), compressor(s), and outdoor coil(s), including means to provide a heating function. Heat pumps shall provide the function of air heating with controlled temperature, and may include the functions of air-cooling, air circulation, air cleaning, dehumidifying, or humidifying.

HFC: Hydrofluorocarbon; often used as a refrigerant.

Major Renovation: As defined by the Maryland High Performance Green Building Program, major renovation means the renovation of a building where:

- i) the building shell is to be reused for the new construction
- ii) the heating, ventilating, and air conditioning (HVAC), electrical, and plumbing systems are to be replaced;
- iii) and the scope of the renovation is 7,500 square feet or greater.

PBDEs: also known as polybrominated diphenyl ethers or brominated flame retardants. Persistent and bioaccumulating chemicals such as polybrominated diphenyl ethers (PBDEs) are added to computers, office electronics, plastics, and polymer resins to reduce the risk of fire; PBDEs include Pentabromodiphenyl ether (pentaBDE), Octabromodiphenyl ether (octaBDE), and Decabromodiphenyl ether, (decaBDE).

Refrigerant: A chemical substance or mixture, either a fluid or a gas, used in a heat pump and refrigeration cycle to absorb heat. Refrigerants are used in air conditioners, refrigerators, freezers, and heat pumps.

Single Package: A single package unit is a central air conditioner that combines both condenser and air handling capabilities in a single casing.

SmartWay: Program established by the U.S. EPA to help improve fuel efficiencies and sustainability in freight transportation.

Appendix B – HFC Prohibitions by End-Use Category

A complete list of HFC prohibitions and exceptions in all end-use categories can be found here:
<http://www.dsd.state.md.us/comar/comarhtml/26/26.11.33.03.htm>.

End-Use Category: Aerosol Propellants	
End-Use	Prohibited Substances
Aerosol Propellants	HFC-125, HFC-134a, HFC-227ea and blends of HFC-227ea and HFC-134a
End-Use Category: Air Conditioning	
End-Use	Prohibited Substances
Centrifugal chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, HFC-236fa, HFC245fa, R-125/ 134a/ 600a (28.1/70/1.9), R-125/ 290/ 134a/ 600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R- 410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-423A, R-424A, R-434A, R438A, R-507A, RS-44 (2003 composition), THR-03
Positive displacement chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R125/ 134a/ 600a (28.1/70/1.9), R- 125/ 290/ 134a/ 600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-424A, R-434A, R-437A, R438A, R-507A, RS-44 (2003 composition), SP34E, THR-03
End-Use Category: Refrigeration	
End-Use	Prohibited Substances
Cold storage warehouses (new)	HFC-227ea, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R404A, R-407A, R-407B, R-410A, R-410B, R-417A, R-421A, R421B, R-422A, R-422B, R-422C, R-422D, R-423A, R-424A, R428A, R-434A, R-438A, R-507A, RS-44 (2003 composition)
Household refrigerators and freezers (new)	FOR12A, FOR12B, HFC-134a, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03

Household refrigerators and freezers—compact (new)	FOR12A, FOR12B, HFC-134a, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03
Household refrigerators and freezers—built-in appliances (new)	FOR12A, FOR12B, HFC-134a, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03
Supermarket systems (retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A
Supermarket systems (new)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A
Remote condensing units (retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A
Remote condensing units (new)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A
Stand-alone units (retrofit)	R-404A, R-507A
Stand-alone medium-temperature units (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R407A, R-407B, R-407C, R-407F, R-410A, R-410B, R417A, R-421A, R-421B, R-422A, R-422B, R-422C, R422D, R-424A, R-426A, R-428A, R-434A, R-437A, R438A, R-507A, RS-24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03
Stand-alone low- temperature units (new)	HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R422A, R-422B, R-422C, R-422D, R-424A, R-428A, R434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)

Refrigerated food processing and dispensing equipment (new)	HFC-227ea, KDD6, R-125/ 290/ 134a/ 600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)
Vending machines (retrofit)	R-404A, R-507A
Vending machines (new)	FOR12A, FOR12B, HFC-134a, KDD6, R125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R407C, R-410A, R-410B, R-417A, R-421A, R-422B, R422C, R-422D, R-426A, R-437A, R-438A, R-507A, RS-24 (2002 formulation), SP34E
End-Use Category: Foams	
End-Use	Prohibited Substances
Rigid polyurethane and polyisocyanurate laminated boardstock	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof
Flexible Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof
Integral Skin Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6
Polystyrene Extruded Sheet	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6
Phenolic Insulation Board and Banstock	HFC-143a, HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof
Rigid Polyurethane: Slabstock and Other	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6
Rigid polyurethane appliance foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6
Rigid polyurethane commercial refrigeration and sandwich panels	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6
Polyolefin	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6

Rigid polyurethane marine flotation foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6
Polystyrene extruded boardstock and billet (XPS)	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel B, Formacel Z-6
Rigid polyurethane (PU) high-pressure two-component spray foam	HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI
Rigid polyurethane (PU) low-pressure two-component spray foam	HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI
Rigid polyurethane (PU) one-component foam sealants	HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI

List of Exceptions by End-Use Category

End-Use Category	Prohibited Substances	Acceptable Uses
Aerosol Propellants	HFC-134a	Cleaning products for removal of grease, flux and other soils from electrical equipment; refrigerant flushes; products for sensitivity testing of smoke detectors; lubricants and freeze sprays for electrical equipment or electronics; sprays for aircraft maintenance; sprays containing corrosion preventive compounds used in the maintenance of aircraft, electrical equipment or electronics, or military equipment; pesticides for use near electrical wires, in aircraft, in total release insecticide foggers, or in certified organic use pesticides for which EPA has specifically disallowed all other lower-GWP propellants; mold release agents and mold cleaners; lubricants and cleaners for spinnerettes for synthetic fabrics; duster sprays specifically for removal of dust from photographic negatives, semiconductor chips, specimens under electron microscopes, and energized electrical equipment; adhesives and sealants in large canisters; document preservation sprays; FDA-approved MDIs for medical purposes; wound care sprays; topical coolant

		sprays for pain relief; and products for removing bandage adhesives from skin.
Aerosol propellants	HFC-227ea and blends of HFC-227ea and HFC-134a	FDA-approved MDIs for medical purposes.
Air conditioning	HFC-134a	Military marine vessels where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements.
Air conditioning	HFC-134a and R- 404A	Human-rated spacecraft and related support equipment where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements.
Foams — except rigid polyurethane (PU) spray foam	All substances	Military applications where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements until January 1, 2022.
Foams — except rigid polyurethane (PU) spray foam	All substances	Space- and aeronautics-related applications where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements until January 1, 2025.

Appendix C

GPC's Energy Efficiency Requirements for HVAC Systems – 2018 IECC

The following tables provide the State of Maryland's minimum efficiency requirements (highlighted in green). To the maximum extent practicable, and when the equipment is manufactured and available at a higher efficiency rating than the current code, the following products are required to be 15% more efficient in performance than the standards set by the most recent version of the IECC in effect at the time of purchase.

Please refer to the [GPC's Environmentally Preferable Specification for HVAC Systems](#) for all other minimum requirements (i.e. as related to refrigerants, repair and maintenance, technician certifications, etc.).

IECC TABLE C403.3.2(1)
MINIMUM EFFICIENCY REQUIREMENTS
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE		
Air conditioners, air cooled	< 65,000 Btu/h ^b	All	Split System	13.00 SEER	14.95 SEER	AHRI 210/240		
			Single Package	14.00 SEER ^c	16.10 SEER ^c			
Through-the-wall (air cooled)	<30,000 Btu/h ^b	All	Split system	12.00 SEER	13.80 SEER			
			Single Package	12.00 SEER	13.80 SEER			
Small-duct high-velocity (air cooled)	< 65,000 Btu/h ^b	All	Split System	11.00 SEER	12.65 SEER			
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.20 EER 12.80 IEER	12.88 EER 14.72 IEER		AHRI 340/360	
		All other	Split System and Single Package	11.10 EER 12.60 IEER	12.77 EER 14.49 IEER			
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.00 EER 12.40 IEER	12.65 EER 14.26 IEER			
		All other	Split System and Single Package	10.80 EER 12.20 IEER	12.42 EER 14.03 IEER			
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.00 EER 11.60 IEER	11.5 EER 13.34 IEER			
		All other	Split System and Single Package	9.80 EER 11.40 IEER	11.27 EER 13.11 IEER			
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.70 EER 11.20 IEER	11.16 EER 12.88 IEER			
		All other	Split System and Single Package	9.50 EER 11.00 IEER	10.93 EER 12.65 IEER			
	Air conditioners, water cooled	< 65,000 Btu/h ^b	All	Split System and Single Package	12.10 EER 12.30 IEER	13.92 EER 14.15 IEER		AHRI 210/240
				≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package		12.10 EER 13.90 IEER
		All other	Split System and Single Package		11.90 EER 13.70 IEER	13.69 EER 15.76 IEER		
		≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.50 EER 13.90 IEER	14.38 EER 15.99 IEER		
All other			Split System and Single Package	12.30 EER 13.70 IEER	14.15 EER 15.76 IEER			

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE		
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.40 EER 13.60 IEER	14.26 EER 15.64 IEER			
		All Other	Split System and Single Package	12.20 EER 13.40 IEER	14.03 EER 14.95 IEER			
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.20 EER 13.50 IEER	14.03 EER 15.53 IEER			
		All other	Split System and Single Package	12.00 EER 13.30 IEER	13.80 EER 15.30 IEER			
Air conditioners, evaporatively cooled	< 65,000 Btu/h b	All	Split System and Single Package	12.10 EER 12.30 IEER	13.92 EER 14.15 IEER	AHRI 210/240		
	≥65,000 Btu/hand < 135,000 Btu/h	Electric Resistance (or None)	Split Systemand Single Package	12.10 EER 12.30 IEER	13.92 EER 14.15 IEER	AHRI 340/360		
		All other	Split Systemand Single Package	11.90 EER 12.10 IEER	13.69 EER 13.92 IEER			
	≥ 135,000 Btu/hand < 240,000 Btu/h	Electric Resistance (or None)	Split Systemand Single Package	12.00 EER 12.20 IEER	13.80 EER 14.03 IEER			
		All other	Split Systemand Single Package	11.80 EER 12.00 IEER	13.57 EER 13.80 IEER			
	≥240,000 Btu/hand < 760,000 Btu/h	Electric Resistance (or None)	Split Systemand Single Package	11.90 EER 12.10 IEER	13.69 EER 13.92 IEER			
		All other	Split Systemand Single Package	11.70 EER 11.90 IEER	13.46 EER 13.69 IEER			
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split Systemand Single Package	11.70 EER 11.90 IEER	13.46 EER 13.69 IEER			
		All other	Split Systemand Single Package	11.50 EER 11.70 IEER	13.23 EER 13.46 IEER			
	Condensing units, air cooled	≥135,000 Btu/h			10.50 EER 11.80 IEER		12.08 EER 13.57 IEER	AHRI365
	Condensing units, water cooled	≥135,000 Btu/h			13.50 EER 14.00 IEER		15.53 EER 16.10 IEER	
	Condensing units, evaporatively cooled	≥135,000 Btu/h			13.50 EER 14.00 IEER		15.53 EER 16.10 IEER	

TABLE C403.3.2(2)
MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
Air cooled (cooling mode)	< 65,000 Btu/h ^b	All	Split System	14.00 SEER	16.1 SEER	AHRI 210/240
			Single Package	14.00 SEER	16.1 SEER	
Through-the-wall, air cooled	≤30,000 Btu/h ^b	All	Split System	12.00 SEER	13.8 SEER	
			Single Package	12.00 SEER	13.8 SEER	
Single-duct high-velocity aircooled	< 65,000 Btu/h ^b	All	Split System	11.00 SEER	12.65 SEER	
Air cooled (cooling mode)	≥65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.00 EER 12.00 IEER	12.65 EER 13.8 IEER	
		All other	Split System and Single Package	10.80 EER 11.80 IEER	12.42 EER 13.57 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.60 EER 11.60 IEER	12.19 EER 13.34 IEER	
		All other	Split System and Single Package	10.40 EER 11.40 IEER	11.96 EER 13.11 IEER	
	≥240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.50 EER 10.60 IEER	10.925 EER 12.19 IEER	
		All other	Split System and Single Package	9.30 EER 9.40 IEER	10.70 EER 10.81 IEER	
Water to Air: Water Loop (cooling mode)	< 17,000 Btu/h	All	86°F entering water	12.20 EER	14.03 EER	ISO 13256-1
	≥ 17,000 Btu/h and < 65,000 Btu/h	All	86°F entering water	13.00 EER	14.95 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	All	86°F entering water	13.00 EER	14.95 EER	
Water to Air: Ground Water (cooling mode)	< 135,000 Btu/h	All	59°F entering water	18.00 EER	20.70 EER	ISO 13256-1
Brine to Air: Ground Loop (cooling mode)	< 135,000 Btu/h	All	77°F entering water	14.10 EER	16.22 EER	ISO 13256-1
Water to Water: Water Loop (cooling mode)	< 135,000 Btu/h	All	86°F entering water	10.60 EER	12.19 EER	ISO 13256-2
Water to Water: Ground Water (cooling mode)	< 135,000 Btu/h	All	59°F entering water	16.30 EER	18.75 EER	
Brine to Water: Ground Loop (cooling mode)	< 135,000 Btu/h	All	77°F entering fluid	12.10 EER	13.92 EER	
Air cooled (heating mode)	< 65,000 Btu/h ^b	—	Split System	8.20 HSPF	6.97 HSPF	
		—	Single Package	8.00 HSPF	6.8 HSPF	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
Through-the-wall, (air cooled, heating mode)	≤30,000 Btu/h ^b (cooling capacity)	—	Split System	7.40 HSPF	6.29 HSPF	AHRI 210/240
		—	Single Package	7.40 HSPF	6.29 HSPF	
Small-duct high velocity (air cooled, heating mode)	< 65,000 Btu/h ^b	—	Split System	6.80 HSPF	5.78 HSPF	
Air cooled (heating mode)	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	—	47°F db/43°F wb outdoor air	3.30 COP	3.80 COP	AHRI 340/360
			17°F db/15°F wb outdoor air	2.25 COP	2.59 COP	
	≥135,000 Btu/h (cooling capacity)	—	47°F db/43°F wb outdoor air	3.20 COP	3.68 COP	
			17°F db/15°F wb outdoor air	2.05 COP	2.36 COP	
Water to Air: Water Loop (heating mode)	< 135,000 Btu/h (cooling capacity)	—	68°F entering water	4.30 COP	4.95 COP	ISO 13256-1
Water to Air: Ground Water (heating mode)	< 135,000 Btu/h (cooling capacity)	—	50°F entering water	3.70 COP	4.26 COP	
Brine to Air: Ground Loop (heating mode)	< 135,000 Btu/h (cooling capacity)	—	32°F entering fluid	3.20 COP	3.68 COP	
Water to Water: Water Loop (heating mode)	< 135,000 Btu/h (cooling capacity)	—	68°F entering water	3.70 COP	4.26 COP	ISO 13256-2
Water to Water: Ground Water (heating mode)	< 135,000 Btu/h (cooling capacity)	—	50°F entering water	3.10 COP	3.57 COP	
Brine to Water: Ground Loop (heating mode)	< 135,000 Btu/h (cooling capacity)	—	32°F entering fluid	2.50 COP	2.88 COP	

TABLE C403.3.2(3)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS, PACKAGED
TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS, SINGLE
VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR- CONDITIONER HEAT
PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
PTAC (coolingmode) new construction	All Capacities	95°F db outdoor air	14.0 – (0.300 X _c Cap/1000) EER	16.1– (0.300 X_c Cap/1000) EER	AHRI 310/380
PTAC (coolingmode) replacements	All Capacities	95°F db outdoor air	10.9 - (0.213 XCap/1000) EER	12.5359 - (0.213 X Cap/1000) EER	
PTHP (coolingmode) new construction	All Capacities	95°F db outdoor air	14.0 - (0.300 XCap/1000) EER	16.1- (0.300 XCap/1000) EER	
PTHP (coolingmode) replacements	All Capacities	95°F db outdoor air	10.8 - (0.213 XCap/1000) EER	12.42- (0.213 XCap/1000) EER	
PTHP (heatingmode) new construction	All Capacities	—	3.2 - (0.026 X Cap/1000) COP	3.68- (0.026 X Cap/1000) COP	
PTHP (heatingmode) replacements	All Capacities	—	2.9 - (0.026 X Cap/1000) COP	3.335- (0.026 X Cap/1000) COP	
SPVAC (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	9.00 EER	10.35 EER	AHRI 390
	≥65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	8.90 EER	10.235 EER	
	≥135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	8.60 EER	9.89 EER	
SPVHP (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	9.00 EER	10.35 EER	AHRI 390
	≥65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	8.90 EER	10.24 EER	
	≥135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	8.60 EER	9.89 EER	
SPVHP (heating mode)	< 65,000 Btu/h	47°F db/ 43°F wb outdoor air	3.00 COP	3.45 COP	AHRI 390
	≥65,000 Btu/h and < 135,000 Btu/h	47°F db/ 43°F wb outdoor air	3.00 COP	3.45 COP	
	≥135,000 Btu/h and < 240,000 Btu/h	47°F db/ 75°F wb outdoor air	2.90 COP	3.34 COP	

Room air conditioners, with louvered sides	< 6,000 Btu/h	—	11.0 CEER	12.65 CEER	ANSI/AHAM RAC-1
	≥6,000 Btu/h and < 8,000 Btu/h	—	11.0 CEER	12.65 CEER	
	≥8,000 Btu/h and < 14,000 Btu/h	—	10.90 CEER	12.535 CEER	
	≥14,000 Btu/h and < 20,000 Btu/h	—	10.70 CEER	12.31 CEER	
	≥ 20,000 Btu/h	—	8.50 EER	9.78 EER	
Room air conditioners, without louvered sides	< 6,000 Btu/h	—	10.00 CEER	11.50 CEER	
	≥6,000 Btu/h and < 8,000 Btu/h	—	10.00 CEER	11.50 CEER	
	≥8,000 Btu/h and < 11,000 Btu/h	—	9.60 CEER	11.04 CEER	
	≥11,000 Btu/h and < 14,000 Btu/h	—	9.50 CEER	10.93 CEER	
	≥14,000 Btu/h and < 20,000 Btu/h	—	9.30 CEER	10.70 CEER	
	≥20,000 Btu/h	—	9.40 CEER	10.81 CEER	
Room air- conditioner heat pumps with louvered sides	< 20,000 Btu/h	—	9.00 EER	10.35 EER	
	≥20,000 Btu/h	—	8.50 EER	9.775 EER	
Room air- conditioner heat pumps without louvered sides	< 14,000 Btu/h	—	8.50 EER	9.78 EER	
	≥14,000 Btu/h	—	8.00 EER	9.20 EER	
Room air conditioner casement only	All capacities	—	9.50 CEER	10.93 CEER	ANSI/AHAM RAC-1
Room air conditioner casement-slider	All capacities	—	10.40 CEER	11.96 CEER	

TABLE C403.3.2(4)
WARM-AIR FURNACES AND COMBINATION WARM-AIR FURNACES/AIR CONDITIONING
UNITS, WARM-AIR DUCT FURNACES AND UNIT HEATERS, MINIMUM EFFICIENCY
REQUIREMENTS

EQUIPMENTTYPE	SIZE CATEGORY(INPUT)	SUBCATEGORY OR RATING CONDITION	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
Warm-air furnaces, gas fired	< 225,000 Btu/h	—	80% AFUE or 80% E_f	92% AFUE or 92%E_f	DOE 10 CFR Part 430 or ANSI Z21.47
	≥ 225,000 Btu/h	Maximum capacity	80% E_f	92%E_f	ANSI Z21.47
Warm-air furnaces, oil fired	< 225,000 Btu/h	—	83% AFUE or 80% E_f	95.45% AFUE or 92%E_f	DOE 10 CFR Part 430 or UL 727
	≥ 225,000 Btu/h	Maximum capacity	81% E_f	93.15%E_f	UL 727
Warm-air duct furnaces, gas fired	All capacities	Maximum capacity	80% E_c	92%E_c	ANSI Z83.8
Warm-air unit heaters, gas fired	All capacities	Maximum capacity	80% E_c	92%E_c	ANSI Z83.8
Warm-air unit heaters, oil fired	All capacities	Maximum capacity	80% E_c	92%E_c	UL 731

TABLE C403.3.2(5)
MINIMUM EFFICIENCY REQUIREMENTS: GAS- AND OIL-FIRED BOILERS

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	SIZE CATEGORY(INPUT)	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
Boilers, hotwater	Gas-fired	< 300,000 Btu/h	82% AFUE	94.3% AFUE	10 CFR Part 430
		≥300,000 Btu/h and ≤2,500,000 Btu/h	80% E_t	92% E_t	10 CFR Part 431
		> 2,500,000 Btu/h	82% E_c	94.3% E_c	
	Oil-fired	< 300,000 Btu/h	84% AFUE	96.6% AFUE	10 CFR Part 430
		≥300,000 Btu/h and ≤2,500,000 Btu/h	82% E_t	94.3% E_t	10 CFR Part 431
		> 2,500,000 Btu/h	84% E_c	96.6% E_c	
Boilers, steam	Gas-fired	< 300,000 Btu/h	80% AFUE	92% AFUE	10 CFR Part 430
	Gas-fired- all, except natural draft	≥ 300,000 Btu/h and ≤2,500,000 Btu/h	79% E_t	90.85% E_t	10 CFR Part 431
		> 2,500,000 Btu/h	79% E_T	90.85% E_T	
	Gas-fired-naturaldraft	≥ 300,000 Btu/h and ≤2,500,000 Btu/h	77% E_t	88.55% E_t	
		> 2,500,000 Btu/h	77% E_T	88.55% E_T	
	Oil-fired	< 300,000 Btu/h	82% AFUE	94.3% AFUE	10 CFR Part 430
		≥ 300,000 Btu/h and ≤2,500,000 Btu/h	81% E_T	93.15% E_T	10 CFR Part 431
		> 2,500,000 Btu/h	81% E_T	93.15% E_T	

TABLE C403.3.2(6)
MINIMUM EFFICIENCY REQUIREMENTS: CONDENSING UNITS, ELECTRICALLY OPERATED

EQUIPMENT TYPE	SIZE CATEGORY	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
Condensing units, air cooled	≥135,000 Btu/h	10.10 EER 11.20 IPLV	11.62 EER 12.88 IPLV	AHRI 365
Condensing units, water or evaporatively cooled	≥ 135,000 Btu/h	13.10 EER 13.10 IPLV	15.05 EER 15.05 IPLV	

TABLE C403.3.2(7)
WATER CHILLING PACKAGES - EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	2018 IECC MINIMUM EFFICIENCY		GPC MINIMUM EFFICIENCY (2018)		TEST PROCEDURE	
			Path A	Path B	Path A	Path B		
Air-cooled chillers	< 150 Tons	EER (Btu/W)	≥10.10 FL	≥9.70 FL	≥11.62 FL	≥11.16 FL	AHRI 550/590	
			≥ 13.70 IPLV	≥15,800 IPLV	≥15.76 IPLV	≥18,17 IPLV		
	≥150 Tons		≥10.10 FL	≥9.70 FL	≥11.62 FL	≥11.16 FL		
	≥14.00 IPLV		≥16.10 IPLV	≥16.1 IPLV	≥18.51 IPLV			
Air cooled without condenser, electrically operated	All capacities	EER (Btu/W)	Air-cooled chillers without condenser shall be rated with matching condensers and complying with air-cooled chiller efficiency requirements.					
Water cooled, electrically operated positive displacement	< 75 Tons	kW/ton	≤0.75 FL	≤0.78 FL	≤0.86 FL	≤0.90 FL		
			≤0.60 IPLV	≤0.50 IPLV	≤0.69 IPLV	≤0.90 IPLV		
	≥ 75 tons and <150 tons		≤0.72 FL	≤0.75 FL	≤0.83 FL	≤0.58 FL		
	≤0.56 IPLV		≤0.49 IPLV	≤0.64 IPLV	≤0.86 IPLV			
	≥ 150 tons and < 300 tons		≤0.66 FL	≤0.68 FL	≤0.76 FL	≤0.56 FL		
	≤0.54 IPLV		≤0.44 IPLV	≤0.62 IPLV	≤0.50 IPLV			
	≥ 300 tons and		≤0.61 FL	≤0.625 FL	≤0.70 FL	≤0.72 FL		

	< 600 tons		≤0.52 IPLV	≤0.41 IPLV	≤0.560 IPLV	≤0.47 IPLV	
	≥ 600 tons		≤0.560 FL	≤0.585 FL	≤0.64 FL	≤0.67 FL	
			≤0.50 IPLV	≤0.38 IPLV	≤0.63 IPLV	≤0.44 IPLV	
Water cooled, electrically operated centrifugal	< 150 Tons	kW/ton	≤0.61 FL	≤0.695 FL	≤0.70 FL	≤0.80 FL	
			≤0.55 IPLV	≤0.44 IPLV	≤0.63 IPLV	≤0.50 IPLV	
	≥150 tons and < 300 tons		≤0.61 FL	≤0.635 FL	≤0.70 FL	≤0.73 FL	
	≤0.55 IPLV		≤ 0.40 IPLV	≤0.63 IPLV	≤0.46 IPLV		
	≥300 tons and < 400 tons		≤0.56 FL	≤0.595 FL	≤0.64 FL	≤0.68 FL	
	≤0.52 IPLV		≤0.39 IPLV	≤0.60 IPLV	≤0.45 IPLV		
	≥400 tons and < 600 tons		≤0.56 FL	≤0.585 FL	≤0.64 FL	≤0.67 FL	
	≤0.50 IPLV		≤0.38 IPLV	≤0.58 IPLV	≤0.44 IPLV		
	≥600 Tons		≤0.56 FL	≤0.585 FL	≤0.64 FL	≤0.67 FL	
	≤0.50 IPLV		≤0.38 IPLV	≤0.58 IPLV	≤0.44 IPLV		
Air cooled, absorption, single effect	All capacities	COP	≥0.60 FL	NA	≥0.69 FL	NA	AHRI 560
Water cooled absorption, single effect	All capacities	COP	≥ 0.70 FL	NA	≥0.81 FL	NA	
Absorption, double effect, indirect fired	All capacities	COP	≥ 1.00 FL	NA	≥1.15 FL	NA	
			≥1.05 IPLV		≥1.21 IPLV	NA	
Absorption double effect direct fired	All capacities	COP	≥1.00 FL	NA	≥1.15 FL	NA	
			≥ 1.05 IPLV		≥1.21 IPLV	NA	

TABLE C403.3.2(8)
MINIMUM EFFICIENCY REQUIREMENTS: HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥40.2 gpm/hp	≥ 46.23 gpm/hp	CTI ATC-105 and CTI STD-201 RS
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥20.0 gpm/hp	≥ 23 gpm/hp	CTI ATC-105 and CTI STD-201 RS
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	16.1 gpm/hp	≥ 18.52 gpm/hp	CTI ATC-105S and CTI STD-201 RS
Centrifugal fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥7.0 gpm/hp	≥ 8.05 gpm/hp	CTI ATC-105S and CTI STD-201 RS
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥134,000 Btu/h x hp	≥ 154,100 Btu/h x hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥110,000 Btu/h x hp	≥ 126,500 Btu/h x hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥157,000 Btu/h x hp	≥ 180,550 Btu/h x hp	CTI ATC-106
Centrifugal fan + evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥135,000 Btu/h x hp	≥ 155,250 Btu/h x hp	CTI ATC-106
Air-cooled condenser	All	125°F Condensing Temperature 190°F Entering Gas Temperature 15°F subcooling 95°F entering db	≥176,000 Btu/h x hp	≥ 202,400 Btu/h x hp	AHRI 460

**TABLE C403.3.2(9)
MINIMUM EFFICIENCY AIR CONDITIONERS AND CONDENSING
UNITS SERVING COMPUTER ROOMS**

EQUIPMENT TYPE	NET SENSIBLE COOLING CAPACITY	2018 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
		DOWNFLOW UNITS / UPFLOW UNITS	DOWNFLOW UNITS / UPFLOW UNITS	
Air conditioners, air cooled	< 65,000 Btu/h	2.20 / 2.09	2.53/2.40	ANSI/ASHRAE127
	≥65,000 Btu/h and <240,000Btu/h	2.10 / 1.99	2.415/2.29	
	≥240,000 Btu/h	1.90 / 1.79	2.185/2.06	
Air conditioners, water-cooled	< 65,000 Btu/h	2.60 / 2.49	2.99/2.86	
	≥65,000 Btu/h and < 240,000Btu/h	2.50 / 2.39	2.875/2.75	
	≥240,000 Btu/h	2.40 / 2.29	2.76/2.63	
Air conditioners, water-cooled with fluid economizer	< 65,000 Btu/h	2.55 / 2.44	2.9325/2.81	
	≥65,000 Btu/h and < 240,000Btu/h	2.45 / 2.34	2.8175/2.69	
	≥240,000 Btu/h	2.35 / 2.24	2.7025/2.58	
Air conditioners, glycol-cooled (rated at 40% propyleneglycol)	< 65,000 Btu/h	2.50 / 2.39	2.875/2.75	
	≥65,000 Btu/h and < 240,000Btu/h	2.15 / 2.04	2.4725/2.35	
	≥240,000 Btu/h	2.10 / 1.99	2.415/2.29	
Air conditioners, glycol-cooled (rated at 40% propyleneglycol) with fluid economizer	< 65,000 Btu/h	2.45 / 2.34	2.8175/2.69	
	≥65,000 Btu/h and < 240,000Btu/h	2.10 / 1.99	2.415/2.29	
	≥240,000 Btu/h	2.05 / 1.94	2.3575/2.23	

**TABLE C403.3.2(10)
HEAT TRANSFER EQUIPMENT**

EQUIPMENT TYPE	SUBCATEGORY	GPC MINIMUM EFFICIENCY (2018)	TEST PROCEDURE
Liquid-to-liquid heat exchangers	Plate type	No Requirement	AHRI 400

Appendix D

GPC's Energy Efficiency Requirements for HVAC Systems – 2021 IECC

The following tables provide the State of Maryland's minimum efficiency requirements (highlighted in green). To the maximum extent practicable, and when the equipment is manufactured and available at a higher efficiency rating than the current code, the following products are required to be 15% more efficient in performance than the standards set by the most recent version of the IECC in effect at the time of purchase.

Please refer to the [GPC's Environmentally Preferable Specification for HVAC Systems](#) for all other minimum requirements (i.e. as related to refrigerants, repair and maintenance, technician certifications, etc.).

IECC TABLE C403.3.2(1)
MINIMUM EFFICIENCY REQUIREMENTS
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY (before 1/1/2023)	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Air conditioners, air cooled	< 65,000 Btu/h	All	Split System	13.0 SEER	14.95 SEER	AHRI 210/240
			Single Package	14.0 SEER	16.10 SEER	
Through-the-wall (air cooled)	≤ 30,000 Btu/h	All	Split system	12.0 SEER	13.80 SEER	
			Single Package	12.0 SEER	13.80 SEER	
Small-duct high-velocity (air cooled)	< 65,000 Btu/h	All	Split System	12.0 SEER	13.80 SEER	
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.2 EER	12.88 EER	AHRI 340/360
		All other		12.9 IEER	14.83 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)		11.0 EER	12.65 EER	
		All other		12.7 IEER	14.61 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)		11.0 EER	12.65 EER	
		All other		12.4 IEER	14.26 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)		10.8 EER	12.42 EER	
		All other		12.2 IEER	14.03 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)		10.0 EER	11.5 EER	
		All other		11.6 IEER	13.34 IEER	
≥ 760,000 Btu/h	Electric Resistance (or None)	9.8 EER	11.27 EER			
	All other	11.4 IEER	13.11 IEER			
Air conditioners, water cooled	< 65,000 Btu/h	All	Split System and Single Package	12.1 EER	13.92 EER	AHRI 210/240
				12.3 IEER	14.15 IEER	
≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	12.1 EER		13.92 EER		
	All other	13.9 IEER		16.00 IEER		
≥ 65,000 Btu/h and < 135,000 Btu/h	All other	All other		11.9 EER	13.69 EER	
				13.7 IEER	15.76 IEER	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY (before 1/1/2023)	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Air conditioners, water cooled	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.5 EER 13.9 IEER	14.38 EER 15.99 IEER	AHRI 340/360
		All other		12.3 EER 13.7 IEER	14.15 EER 15.76 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)		12.4 EER 13.6 IEER	14.26 EER 15.64 IEER	AHRI 340/360
		All other		12.2 EER 13.4 IEER	14.03 EER 15.41 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)		12.2 EER 13.5 IEER	14.03 EER 15.53 IEER	
		All other		12.0 EER 13.3 IEER	13.80 EER 15.30 IEER	
Air conditioners, evaporatively cooled	< 65,000 Btu/h	All	Split System and Single Package	12.1 EER 12.3 IEER	13.92 EER 14.15 IEER	AHRI 210/240
	≥65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)		12.1 EER 12.3 IEER	13.92 EER 14.15 IEER	AHRI 340/360
		All other		11.9 EER 12.1 IEER	13.69 EER 13.92 IEER	
	≥135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)		12.0 EER 12.2 IEER	13.80 EER 14.03 IEER	
		All other		11.8 EER 12.0 IEER	13.57 EER 13.80 IEER	
	≥240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)		11.9 EER 12.1 IEER	13.69 EER 13.92 IEER	
		All other		11.7 EER 11.9 IEER	13.46 EER 13.69 IEER	
	≥760,000 Btu/h	Electric Resistance (or None)		11.7 EER 11.9 IEER	13.46 EER 13.69 IEER	
		All other		11.5 EER 11.7 IEER	13.23 EER 13.46 IEER	
	Condensing units, air cooled	≥ 135,000 Btu/h		-	-	10.5 EER 11.8 IEER
Condensing units, water cooled	≥ 135,000 Btu/h	-	-	13.5 EER 14.0 IEER	15.53 EER 16.10 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h	-	-	13.5 EER 14.0 IEER	15.53 EER 16.10 IEER	

TABLE C403.3.2(2)
ELECTRICALLY OPERATED AIR-COOLED UNITARY HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	HEADING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY (before 1/1/2023)	GPC MINIMUM EFFICIENCY (before 1/1/2023)	TEST PROCEDURE
Air cooled (cooling mode)	< 66,000 Btu/h	All	Split system, three phase and applications outside US single phase	14.0 SEER	16.1 SEER	AHRI 210/240—2017
			Single package, three phase and applications outside US single phase	13.4 SEER2	11.39 SEER	
Space constrained, aircooled (cooling mode)	≤ 30,000 Btu/h	All	Split system, three phase and applications outside US single phase	11.7 SEER2	9.95 SEER	AHRI 210/240—2017
			Single package, three phase and applications outside US single phase	11.7 SEER2	9.95 SEER	
Single duct, high velocity, air cooled (cooling mode)	< 65,000	All	Split system, three phase and applications outside US single phase	12.0 SEER	13.8 SEER	AHRI 210/240—2017
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric resistance (or none)	Split system and single package	11.0 EER 12.2 IEER	12.65 EER 14.03 IEER	AHRI 340/360
		All other		10.8 EER 12.0 IEER	12.42 EER 13.8 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric resistance (or none)		10.6 EER 11.6 IEER	12.19 EER 13.34 IEER	
		All other		10.4 EER 11.4 IEER	11.96 EER 13.11 IEER	
	≥ 240,000 Btu/h	Electric resistance (or none)		9.5 EER 10.6 IEER	10.93 EER 12.19 IEER	
		All Other		9.3 EER 10.4 IEER	10.70 EER 11.96 IEER	

EQUIPMENTTYPE	SIZE CATEGORY	HEADING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY (before 1/1/2023)	GPC MINIMUM EFFICIENCY (before 1/1/2023)	TEST PROCEDURE
		All other				
Space constrained, aircooled (heating mode)	≤ 30,000 Btu/h	All	Split system, three phase and applications outside US single phase	7.4 HSPF	6.29 HSPF	AHRI 210/240
			Single package, three phase and applications outside US single phase	7.4 HSPF	6.29 HSPF	
Small duct, high velocity, air cooled (heating mode)	< 65,000 Btu/h	All	Split system, three phase and applications outside US single phase	7.2 HSPF	6.12 HSPF	AHRI 210/240
Air cooled (heating mode)	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	All	47°F db/43°F wb outdoor air	3.30 COP _H	3.80 COP_H	AHRI 340/360
			17°F db/15°F wb outdoor air	2.25 COP _H	2.59 COP_H	
	≥ 135,000 Btu/h and < 240,000 Btu/h (cooling capacity)		47°F db/43°F wb outdoor air	3.20 COP _H	3.68 COP_H	
			17°F db/15°F wb outdoor air	2.05 COP _H	2.36 COP_H	
	≥ 240,000 Btu/h (cooling capacity)		47°F db/43°F wb outdoor air	3.20 COP _H	3.68 COP_H	
			17°F db/15°F wb outdoor air	2.05 COP _H	2.36 COP_H	
Air cooled (heating mode)	< 65,000 Btu/h	All	Split system, three phase and applications outside US single phase	7.5 HSPF2	6.38 HSPF2	AHRI 210/240
			Single package, three phase and applications outside US single phase	6.7 HSPF2	5.70 HSPF2	

TABLE C403.3.2(3)
WATER-CHILLING PACKAGES—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	2021 IECC MINIMUM EFFICIENCY (before 1/1/2023)		GPC MINIMUM EFFICIENCY (before 1/1/2023)		TEST PROCEDURE
			PATH A	PATH B	PATH A	PATH B	
Air cooled chillers	< 150 tons	EER (Btu/Wh)	≥ 10.10 FL	≥ 9.700 FL	≥11.615 FL	≥11.16 FL	AHRI 550/590
			≥ 13.70 IPLV.IP	≥ 15.800 IPLV.IP	≥15.755 IPLV.IP	≥18.17 IPLV.IP	
	≥ 150 tons		≥ 10.10 FL	≥9.700FL	≥11.615 FL	≥11.16 FL	
			≥ 14.00 IPLV.IP	≥ 16.100 IPLV.IP	≥16.1 IPLV.IP	≥18.515 IPLV.IP	
Air cooled without condenser, electrically operated	All capacities	EER (Btu/Wh)	Air-cooled chillers without condenser must be rated with matching condensers and comply with air-cooled chiller efficiency requirements				AHRI 550/590
Water cooled, electrically operated positive displacement	< 75 tons	kW/ton	≤ 0.75 FL	≤ 0.78 FL	≤ 0.86 FL	≤ 0.90 FL	AHRI 550/590
	≥ 75 tons and < 150 tons		≤ 0.60 IPLV.IP	≤ 0.50 IPLV.IP	≤0.69 IPLV.IP	≤ 0.58 IPLV.IP	
			≤ 0.72 FL	≤ 0.75 FL	≤0.83 FL	≤ 0.86 FL	
	≥ 150 tons and < 300 tons		≤ 0.56 IPLV.IP	≤ 0.49 IPLV.IP	≤0.64 IPLV.IP	≤ 0.56 IPLV.IP	
			≤ 0.66 FL	≤ 0.68 FL	≤0.76 FL	≤ 0.78 FL	
	≥ 300 tons and < 600 tons		≤ 0.54 IPLV.IP	≤ 0.44 IPLV.IP	≤0.62 IPLV.IP	≤ 0.50 IPLV.IP	
			≤ 0.61 FL	≤ 0.62 FL	≤0.70 FL	≤ 0.72 FL	
	≥ 600 tons		≤ 0.52 IPLV.IP	≤ 0.41 IPLV.IP	≤0.60 IPLV.IP	≤ 0.47 IPLV.IP	
≤ 0.56 FL		≤ 0.58 FL	≤0.64 FL	≤ 0.67 FL			
Water cooled, electrically operated centrifugal	< 150 tons	kW/ton	≤ 0.61 FL	≤ 0.69 FL	≤0.70 FL	≤ 0.80 FL	AHRI 550/590
			≤ 0.55 IPLV.IP	≤ 0.44 IPLV.IP	≤0.63 IPLV.IP	≤ 0.51 IPLV.IP	
			≤ 0.61 FL	≤ 0.63 FL	≤0.70 FL	≤ 0.73 FL	
	≥ 300 tons and < 400 tons		≤ 0.55 IPLV.IP	≤ 0.40 IPLV.IP	≤0.63 IPLV.IP	≤ 0.46 IPLV.IP	
			≤ 0.56 FL	≤ 0.59 FL	≤0.64 FL	≤ 0.68 FL	
	≥ 400 tons and < 600 tons		≤ 0.52 IPLV.IP	≤ 0.39 IPLV.IP	≤0.60 IPLV.IP	≤ 0.45 IPLV.IP	
			≤ 0.56 FL	≤ 0.59 FL	≤0.64 FL	≤ 0.67 FL	
	≥ 600 tons		≤ 0.50 IPLV.IP	≤ 0.38 IPLV.IP	≤0.58 IPLV.IP	≤ 0.44 IPLV.IP	
≤ 0.56 FL		≤ 0.59 FL	≤0.64 FL	≤ 0.67 FL			
	≤ 0.50 IPLV.IP	≤ 0.38 IPLV.IP	≤0.58 IPLV.IP	≤ 0.44 IPLV.IP			
	≤ 0.56 FL	≤ 0.59 FL	≤0.64 FL	≤ 0.67 FL			
Air cooled absorption, single effect	All capacities	COP (W/W)	≥ 0.60 FL	NA	≥ 0.69 FL	NA	AHRI 560

Water cooled absorption, single effect	All capacities	COP (W/W)	≥ 0.70 FL	NA	≥ 0.81 FL	NA	AHRI 560
Absorption double effect, indirect fired	All capacities	COP (W/W)	≥ 1.00 FL	NA	≥ 1.15 FL	NA	AHRI 560
			≥ 0.15 IPLV.IP		≥ 0.17 IPLV.IP	NA	
Absorption double effect, direct fired	All capacities	COP (W/W)	≥ 1.00 FL	NA	≥ 1.15 FL	NA	AHRI 560
			≥ 1.00 IPLV		≥ 1.15 IPLV	NA	

TABLE C403.3.2(4)
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS, PACKAGED
TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS, SINGLE-
PACKAGE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-
CONDITIONER HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
PTAC (cooling mode) standard size	< 7,000 Btu/h	95°F db/75°F wb outdoor air	11.9 EER	13.69 EER	AHRI 310/380
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		14.0 – (0.300 × Cap/1,000) EER	16.1 – (0.300 × Cap/1,000) EER	
	> 15,000 Btu/h		9.5 EER	10.93 EER	
PTAC (cooling mode) nonstandard size	< 7,000 Btu/h	95°F db/75°F wb outdoor air	9.4 EER	10.81 EER	AHRI 310/380
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		10.9 – (0.213 × Cap/1,000) EER	12.54 – (0.213 × Cap/1,000) EER	
	> 15,000 Btu/h		7.7 EER	8.855 EER	
PTHP (cooling mode) standard size	< 7,000 Btu/h	95°F db/75°F wb outdoor air	11.9 EER	13.685 EER	AHRI 310/380
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		14.0 – (0.300 × Cap/1,000) EER	16.1 – (0.300 × Cap/1,000) EER	
	> 15,000 Btu/h		9.5 EER	10.93 EER	
PTHP (cooling mode) nonstandard size	< 7,000 Btu/h	95°F db/75°F wb outdoor air	9.3 EER	10.70 EER	AHRI 310/380
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		10.8 – (0.213 × Cap/1,000) EER	12.42 – (0.213 × Cap/1,000) EER	
	> 15,000 Btu/h		7.6 EER	8.74 EER	
PTHP (heating mode) standard size	< 7,000 Btu/h	47°F db/43°F wb outdoor air	3.3 COP _H	3.795 COP _H	AHRI 310/380
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		3.7 – (0.052 × Cap/1,000) COP _H	4.26 – (0.052 × Cap/1,000) COP _H	
	> 15,000 Btu/h		2.90 COP _H	3.34 COP _H	
PTHP (heating mode) nonstandard size	< 7,000 Btu/h	47°F db/43°F wb outdoor air	2.7 COP _H	3.11 COP _H	AHRI 310/380
	≥ 7,000 Btu/h and ≤ 15,000 Btu/h		2.9 – (0.026 × Cap/1000) COP _H	3.34 – (0.026 × Cap/1000) COP _H	
	> 15,000 Btu/h		2.5 COP _H	2.88 COP _H	
SPVAC (cooling mode) single and three phase	< 65,000 Btu/h	95°F db/75°F wb outdoor air	11.0 EER	12.65 EER	AHRI 390
	≥ 65,000 Btu/h and ≤ 135,000 Btu/h		10.0 EER	11.50 EER	
	≥ 135,000 Btu/h and ≤ 240,000 Btu/h		10.0 EER	11.50 EER	
SPVHP (cooling mode)	< 65,000 Btu/h	95°F db/75°F wb outdoor air	11.0 EER	12.65 EER	AHRI 390
	≥ 65,000 Btu/h and ≤ 135,000 Btu/h		10.0 EER	11.50 EER	
	≥ 135,000 Btu/h and ≤ 240,000 Btu/h		10.1 EER	11.62 EER	
SPVHP (heating mode)	< 65,000 Btu/h	47°F db/43°F wb outdoor air	3.3 COP _H	3.80 COP _H	AHRI 390
	≥ 65,000 Btu/h and ≤ 135,000 Btu/h		3.0 COP _H	3.45 COP _H	
	≥ 135,000 Btu/h and ≤ 240,000 Btu/h		3.0 COP _H	3.45 COP _H	
	< 6,000 Btu/h	—	11.0 CEER	12.65 CEER	

Room air conditioners without reverse cycle with louvered sides for applications outside US	$\geq 6,000$ Btu/h and $< 8,000$ Btu/h	—	11.0 CEER	12.65 CEER	ANSI/AHAM RAC-1
	$\geq 8,000$ Btu/h and $< 14,000$ Btu/h	—	10.9 CEER	12.54 CEER	
	$\geq 14,000$ Btu/h and $< 20,000$ Btu/h	—	10.7 CEER	12.31 CEER	
	$\geq 20,000$ Btu/h and $< 28,000$ Btu/h	—	9.4 CEER	10.81 CEER	
	$\geq 28,000$ Btu/h	—	9.0 CEER	10.35 CEER	
Room air conditioners without louvered sides	$< 6,000$ Btu/h	—	10.0 CEER	11.50 CEER	ANSI/AHAM RAC-1
	$\geq 6,000$ Btu/h and $< 8,000$ Btu/h	—	10.0 CEER	11.50 CEER	
	$\geq 8,000$ Btu/h and $< 11,000$ Btu/h	—	9.6 CEER	11.04 CEER	
	$\geq 11,000$ Btu/h and $< 14,000$ Btu/h	—	9.5 CEER	10.93 CEER	
	$\geq 14,000$ Btu/h and $< 20,000$ Btu/h	—	9.3 CEER	10.70 CEER	
Room air conditioners with reverse cycle, with louvered sides for applications outside US	$< 20,000$ Btu/h	—	9.8 CEER	11.27 CEER	ANSI/AHAM RAC-1
	$\geq 20,000$ Btu/h	—	9.3 CEER	10.70 CEER	
Room air conditioners with reverse cycle without louvered sides for applications outside US	$< 14,000$ Btu/h	—	9.3 CEER	10.70 CEER	ANSI/AHAM RAC-1
	$\geq 14,000$ Btu/h	—	8.7 CEER	10.01 CEER	
Room air conditioners, casement only for applications outside US	All	—	9.5 CEER	10.93 CEER	ANSI/AHAM RAC-1
Room air conditioners, casement slider for applications outside US	All	—	10.4 CEER	11.96 CEER	ANSI/AHAM RAC-1

TABLE C403.3.2(5)
WARM-AIR FURNACES AND COMBINATION WARM-AIR FURNACES/AIR-CONDITIONING
UNITS, WARM-AIR DUCT FURNACES AND UNIT HEATERS—MINIMUM EFFICIENCY
REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Warm-air furnace, gasfired for application outside the US	< 225,000 Btu/h	Maximum capacity	80% AFUE (non-weatherized) or 81% AFUE (weatherized) or 80% E_t	92% AFUE (non-weatherized) or 93.15% AFUE (weatherized) or 92% E_t	DOE 10 CFR 430 Appendix N or Section 2.39, Thermal Efficiency, ANSI Z21.47
Warm-air furnace, gasfired	< 225,000 Btu/h	Maximum capacity	80% E_t	92% E_t	Section 2.39, Thermal Efficiency, ANSI Z21.47
Warm-air furnace, oilfired for application outside the US	< 225,000 Btu/h	Maximum capacity	83% AFUE (non-weatherized) or 78% AFUE (weatherized) or 80% E_t	95.45 % AFUE (non-weatherized) or 89.7% AFUE (weatherized) or 92% E_t	DOE 10 CFR 430 Appendix N or Section 42, Combustion, UL 727
Warm-air furnace, oilfired	< 225,000 Btu/h	Maximum capacity	80% E_t	92% E_t	Section 42, Combustion, UL 727
Electric furnaces for applications outside the US	< 225,000 Btu/h	All	96% AFUE	110.4% AFUE	DOE 10 CFR 430 Appendix N
Warm-air duct furnaces, gas fired	All capacities	Maximum capacity	80% E_c^e	92% E_c	Section 2.10, Efficiency, ANSI Z83.8
Warm-air unit heaters, gas fired	All capacities	Maximum capacity	80% E_c	92% E_c	Section 2.10, Efficiency, ANSI Z83.8
Warm-air unit heaters, oilfired	All capacities	Maximum capacity	80% E_c	92% E_c	Section 40, Combustion, UL 731

**TABLE C403.3.2(6)
GAS- AND OIL-FIRED BOILERS—MINIMUM EFFICIENCY REQUIREMENTS**

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	SIZE CATEGORY (INPUT)	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Boilers, hot water	Gas fired	< 300,000 Btu/h ^{a, h} for applications outside US	82% AFUE	94.3% AFUE	DOE 10 CFR 430 Appendix N
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^e	80% E_t	92% E_t	DOE 10 CFR 431.86
		> 2,500,000 Btu/h ^b	82% E_c	94.3% E_c	
	Oil fired	< 300,000 Btu/h ^{a, h} for applications outside US	84% AFUE	96.6% AFUE	DOE 10 CFR 430 Appendix N
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^e	82% E_t	94.3% E_t	DOE 10 CFR 431.86
		> 2,500,000 Btu/h ^b	84% E_c	96.6% E_c	
Boilers, steam	Gas fired	< 300,000 Btu/h ^g for applications outside US	80% AFUE	92% AFUE	DOE 10 CFR 430 Appendix N
	Gas fired – all except natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^e	79% E_t	90.85% E_t	DOE 10 CFR 431.86
		> 2,500,000 Btu/h ^b	79% E_t	90.85% E_t	
	Gas fired—natural draft	≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^e	77% E_t	88.55% E_t	
		> 2,500,000 Btu/h ^b	77% E_t	88.55% E_t	
	Oil fired	< 300,000 Btu/h ^g for applications outside US	82% AFUE	94.3% AFUE	DOE 10 CFR 430 Appendix N
		≥ 300,000 Btu/h and ≤ 2,500,000 Btu/h ^e	81% E_t	93.15% E_t	DOE 10 CFR 431.86
> 2,500,000 Btu/h ^b		81% E_t	93.15% E_t		

TABLE C403.3.2(7)
PERFORMANCE REQUIREMENTS FOR HEAT REJECTION EQUIPMENT—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	TOTAL SYSTEM HEAT-REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 40.2 gpm/hp	≥ 46.23 gpm/hp	CTI ATC-105 and CTISTD-201 RS
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥ 20.0 gpm/hp	≥ 23 gpm/hp	CTI ATC-105 and CTISTD-201 RS
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 16.1 gpm/hp	≥ 18.52 gpm/hp	CTI ATC-105S and CTISTD-201 RS
Centrifugal fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥ 7.0 gpm/hp	≥ 8.05 gpm/hp	CTI ATC-105S and CTISTD-201 RS
Propeller or axial fan drycoolers (air-cooled fluid coolers)	All	115°F entering water 105°F leaving water 95°F entering wb	≥ 4.5 gpm/hp	≥ 5.18 gpm/hp	CTI ATC-105DS
Propeller or axial fan evaporative condensers	All	R-448A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 160,000 Btu/h × hp	≥ 184000 Btu/h × hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 134,000 Btu/h × hp	≥ 154100 Btu/h × hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-448A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥ 137,000 Btu/h × hp	≥ 157550 Btu/h × hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥ 110,000 Btu/h × hp	≥ 126500 Btu/h × hp	CTI ATC-106
Air-cooled condensers	All	125°F condensing temperature 190°F entering gas temperature 15°F subcooling 95°F entering db	≥ 176,000 Btu/h × hp	≥ 202400 Btu/h × hp	AHRI 460

TABLE C403.3.2(8)
ELECTRICALLY OPERATED VARIABLE-REFRIGERANT-FLOW AIR CONDITIONERS—
MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
VRF air conditioners, air cooled	< 65,000 Btu/h	All	VRF multi-split system	13.0 SEER	14.95 SEER	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric resistance (or none)	VRF multi-split system	11.2 EER 13.1 IEER 15.5 IEER	12.88 EER 15.07 IEER 17.83 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric resistance (or none)	VRF multi-split system	11.0 EER 12.9 IEER 14.9 IEER	12.65 EER 14.84 IEER 17.14 IEER	
	≥ 240,000 Btu/h	Electric resistance (or none)	VRF multi-split system	10.0 EER 11.6 IEER 13.9 IEER	11.5 EER 13.34 IEER 15.99 IEER	

TABLE C403.3.2(9)
ELECTRICALLY OPERATED VARIABLE-REFRIGERANT-FLOW AND APPLIED HEAT PUMPS—
MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTIONTYPE	SUBCATEGORY ORRATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
VRF air cooled (cooling mode)	< 65,000 Btu/h	All		13.0 SEER	14.95 SEER	AHRI 1230
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric resistance (or none)	VRF multi-split system	11.0 EER 12.9 IEER 14.6 IEER	12.65 EER 14.84 IEER 16.79 IEER	
			VRF multi-split system with heat recovery	10.8 EER 12.7 IEER 14.4 IEER	12.42 EER 14.61 IEER 16.56 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h		VRF multi-split system	10.6 EER 12.3 IEER 13.9 IEER	12.19 EER 14.15 IEER 15.99 IEER	
			VRF multi-split system with heat recovery	10.4 EER 12.1 IEER 13.7 IEER	11.96 EER 13.92 IEER 15.76 IEER	
	≥ 240,000 Btu/h		VRF multi-split system	9.5 EER 11.0 IEER 12.7 IEER	10.93 EER 12.65 IEER 14.61 IEER	
			VRF multi-split system with heat recovery	9.3 EER 10.8 IEER 12.5 IEER	10.70 EER 12.42 IEER 14.38 IEER	
VRF water source (cooling mode)	< 65,000 Btu/h		All	VRF multi-split systems 86°F entering water	12.0 EER 16.0 IEER	13.80 EER 18.40 IEER
	≥ 65,000 Btu/h and < 135,000 Btu/h	VRF multi-split system with heat recovery 86°F entering water		11.8 EER 15.8 IEER	13.57 EER 18.17 IEER	
		VRF multi-split system 86°F entering water		12.0 EER 16.0 IEER	13.80 EER 18.40 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	VRF multi-split system with heat recovery 86°F entering water		11.8 EER 15.8 IEER	13.57 EER 18.17 IEER	
		VRF multi-split system 86°F entering water		10.0 EER 14.0 IEER	11.50 EER 16.10 IEER	
	≥ 240,000 Btu/h	VRF multi-split system with heat recovery 86°F entering water		9.8 EER 13.8 IEER	11.27 EER 15.87 IEER	
		VRF multi-split system 86°F entering water		10.0 EER 12.0 IEER	11.50 EER 13.80 IEER	
		VRF multi-split system with heat recovery 86°F entering water		9.8 EER 11.8 IEER	11.27 EER 13.57 IEER	
VRF groundwater source (cooling mode)	< 135,000 Btu/h	All	VRF multi-split system 59°F entering water	16.2 EER	18.63 EER	AHRI 1230
			VRF multi-split system with heat recovery 59°F entering water	16.0 EER	18.40 EER	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTIONTYPE	SUBCATEGORY ORRATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
	≥ 135,000 Btu/h		VRF multi-split system 59°F entering water	13.8 EER	15.87 EER	
			VRF multi-split system with heat recovery 59°F entering water	13.6 EER	15.64 EER	
VRF ground source (cooling mode)	< 135,000 Btu/h	All	VRF multi-split system 77°F entering water	13.4 EER	15.41 EER	AHRI 1230
			VRF multi-split system with heat recovery 77°F entering water	13.2 EER	15.18 EER	
	≥ 135,000 Btu/h		VRF multi-split system 77°F entering water	11.0 EER	12.65 EER	
			VRF multi-split system with heat recovery 77°F entering water	10.8 EER	12.42 EER	
VRF air cooled (heating mode)	< 65,000 Btu/h (cooling capacity)	VRF multi-split system	7.7 HSPF	8.86 HSPF	AHRI 1230	
	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	VRF multi-split system 47°F db/43°F wb outdoor air	3.3 COP _H	3.80 COP_H		
		17°F db/15°F wb outdoor air	2.25 COP _H	2.59 COP_H		
	≥ 135,000 Btu/h (cooling capacity)	VRF multi-split system 47°F db/43°F wb outdoor air	3.2 COP _H	3.68 COP_H		
		17°F db/15°F wb outdoor air	2.05 COP _H	2.36 COP_H		
VRF water source (heating mode)	< 65,000 Btu/h (cooling capacity)	VRF multi-split system 68°F entering water	4.2 COP _H 4.3 COP _H	4.83 COP_H 4.95 COP_H	AHRI 1230	
	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	VRF multi-split system 68°F entering water	4.2 COP _H 4.3 COP _H	4.83 COP_H 4.95 COP_H		
	≥ 135,000 Btu/h and < 240,000 Btu/h (cooling capacity)	VRF multi-split system 68°F entering water	3.9 COP _H 4.0 COP _H	4.49 COP_H 4.60 COP_H		
	≥ 240,000 Btu/h (cooling capacity)	VRF multi-split system 68°F entering water	3.9 COP _H	4.49 COP_H		
VRF groundwater source (heating mode)	< 135,000 Btu/h (cooling capacity)	VRF multi-split system 50°F entering water	3.6 COP _H	4.14 COP_H	AHRI 1230	
	≥ 135,000 Btu/h (cooling capacity)	VRF multi-split system 50°F entering water	3.3 COP _H	3.80 COP_H		
VRF ground source (heating mode)	< 135,000 Btu/h (cooling capacity)	VRF multi-split system 32°F entering water	3.1 COP _H	3.57 COP_H	AHRI 1230	
	≥ 135,000 Btu/h (cooling capacity)	VRF multi-split system 32°F entering water	2.8 COP _H	3.22 COP_H		

TABLE C403.3.2(10)
FLOOR-MOUNTED AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	STANDARD MODEL	NET SENSIBLE COOLING CAPACITY	2021 IECC MINIMUM EFFICIENCY		GPC MINIMUM EFFICIENCY		TEST PROCEDURE
			MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/dew point)	MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/dew point)	
Air cooled	Downflow	< 80,000 Btu/h	2.70	85°F/52°F (Class 2)	3.11	97.75°F/59.8°F (Class 2)	AHRI 1360
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.58		2.98		
		≥ 295,000 Btu/h	2.36		2.71		
		< 80,000 Btu/h	2.67		3.07		
	Upflow—ducted	≥ 80,000 Btu/h and < 295,000 Btu/h	2.55		2.93		
		≥ 295,000 Btu/h	2.33		2.68		
		< 65,000 Btu/h	2.16		2.48		
	Upflow—nonducted	≥ 65,000 Btu/h and < 240,000 Btu/h	2.04		75°F/52°F (Class 1)	2.35	
		≥ 240,000 Btu/h	1.89	2.17			
		< 65,000 Btu/h	2.65	3.05			
	Horizontal	≥ 65,000 Btu/h and < 240,000 Btu/h	2.55	95°F/52°F (Class 3)	2.93	109.25°F/59.8°F (Class 3)	
		≥ 240,000 Btu/h	2.47		2.84		
< 80,000 Btu/h		2.70	3.11				
Air cooled with fluid economizer	Downflow	≥ 80,000 Btu/h and < 295,000 Btu/h	2.58	85°F/52°F (Class 1)	2.97	97.75°F/59.8°F (Class 1)	AHRI 1360
		≥ 295,000 Btu/h	2.36		2.71		
		< 80,000 Btu/h	2.67		3.07		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.55		2.93		
	Upflow—ducted	≥ 295,000 Btu/h	2.33		2.68		
		< 65,000 Btu/h	2.09		2.40		
		≥ 65,000 Btu/h and < 240,000 Btu/h	1.99		2.29		
	Upflow—nonducted	≥ 240,000 Btu/h	1.81		2.08	75°F/52°F (Class 1)	
		< 65,000 Btu/h	2.65	3.05			
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.55	2.94			
	Horizontal	≥ 240,000 Btu/h	2.47	2.84	95°F/52°F (Class 3)	109.25°F/59.8°F (Class 3)	
		< 80,000 Btu/h	2.82	3.24			
≥ 80,000 Btu/h and < 295,000 Btu/h		2.73	3.14				
Water cooled	Downflow	≥ 295,000 Btu/h	2.67	85°F/52°F (Class 1)	3.07	97.75°F/59.8°F (Class 1)	AHRI 1360
		< 80,000 Btu/h	2.79		3.21		
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.70		3.11		

	Upflow—nonducted	≥ 295,000 Btu/h	2.64	75°F/52°F (Class 1)	3.04	86.25°F/59.8°F (Class 1)	
		< 65,000 Btu/h	2.43		2.79		
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.32		2.67		
		≥ 240,000 Btu/h	2.20		2.53		
	Horizontal	< 65,000 Btu/h	2.79	95°F/52°F (Class 3)	3.21	109.25°F/59.8°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.68		3.08		
		≥ 240,000 Btu/h	2.60		2.99		
Water cooled with fluid economizer	Downflow	< 80,000 Btu/h	2.77	85°F/52°F (Class 1)	3.19	97.75°F/59.8°F (Class 1)	AHRI 1360
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.68		3.08		
		≥ 295,000 Btu/h	2.61		3.00		
		< 80,000 Btu/h	2.74		3.15		
	Upflow—ducted	≥ 80,000 Btu/h and < 295,000 Btu/h	2.65		3.05		
		≥ 295,000 Btu/h	2.58		2.97		
		< 65,000 Btu/h	2.35	75°F/52°F (Class 1)	2.70	86.25°F/59.8°F (Class 1)	
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.24	2.58				
	≥ 240,000 Btu/h	2.12	2.44				
	Horizontal	< 65,000 Btu/h	2.71	95°F/52°F (Class 3)	3.12	109.25°F/59.8°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.60		2.99		
		≥ 240,000 Btu/h	2.54		2.92		
< 80,000 Btu/h		2.56	85°F/52°F (Class 1)		2.94		97.75°F/59.8°F (Class 1)
≥ 80,000 Btu/h and < 295,000 Btu/h	2.24	2.58					
≥ 295,000 Btu/h	2.21	2.54					
< 80,000 Btu/h	2.53	2.91					
Glycol cooled	Upflow—ducted	≥ 80,000 Btu/h and < 295,000 Btu/h	2.21		2.54		
		≥ 295,000 Btu/h	2.18		2.51		
		< 65,000 Btu/h	2.08	75°F/52°F (Class 1)	2.39	86.25°F/59.8°F (Class 1)	
	≥ 65,000 Btu/h and < 240,000 Btu/h	1.90	2.19				
	≥ 240,000 Btu/h	1.81	2.08				
	Horizontal	< 65,000 Btu/h	2.48	95°F/52°F (Class 3)	2.85	109.25°F/59.8°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.18		2.51		
		≥ 240,000 Btu/h	2.18		2.51		
	Downflow	< 80,000 Btu/h	2.51	85°F/52°F (Class 1)	2.89	97.75°F/59.8°F (Class 1)	
		≥ 80,000 Btu/h and < 295,000 Btu/h	2.19		2.52		
		≥ 295,000 Btu/h	2.15		2.47		
		< 80,000 Btu/h	2.48		2.85		

Glycol cooled with fluid economizer	Upflow—ducted	≥ 80,000 Btu/h and < 295,000 Btu/h	2.16		2.48		AHRI 1360
		≥ 295,000 Btu/h	2.12		2.44		
	Upflow—nonducted	< 65,000 Btu/h	2.00	75°F/52°F (Class 1)	2.30	86.25°F/59.8°F (Class 1)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	1.82		2.09		
		≥ 240,000 Btu/h	1.73		1.99		
	Horizontal	< 65,000 Btu/h	2.44	95°F/52°F (Class 3)	2.81	109.25°F/59.8°F (Class 3)	
		≥ 65,000 Btu/h and < 240,000 Btu/h	2.10		2.42		
		≥ 240,000 Btu/h	2.10		2.42		

TABLE C403.3.2(11)

VAPOR-COMPRESSSION-BASED INDOOR POOL DEHUMIDIFIERS—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Single package indoor (with or without economizer)	Rating Conditions: A or C	3.5 MRE	4.03 MRE	AHRI 910
Single package indoor water cooled (with or without economizer)	Rating Conditions: A, B or C	3.5 MRE	4.03 MRE	
Single package indoor air cooled (with or without economizer)	Rating Conditions: A, B or C	3.5 MRE	4.03 MRE	
Split system indoor air cooled (with or without economizer)	Rating Conditions: A, B or C	3.5 MRE	4.03 MRE	

TABLE C403.3.2(12)

ELECTRICALLY OPERATED DX-DOAS UNITS, SINGLE-PACKAGE AND REMOTE CONDENSER, WITHOUT ENERGY RECOVERY—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Air cooled (dehumidification mode)	—	4.0 ISMRE	4.60 ISMRE	AHRI 920
Air-source heat pumps (dehumidification mode)	—	4.0 ISMRE	4.60 ISMRE	AHRI 920
Water cooled (dehumidification mode)	Cooling tower condenser water	4.9 ISMRE	5.64 ISMRE	AHRI 920
	Chilled water	6.0 ISMRE	6.90 ISMRE	
Air-source heat pump (heating mode)	—	2.7 ISCOP	3.11 ISCOP	AHRI 920
Water-source heat pump (dehumidification mode)	Ground source, closed loop	4.8 ISMRE	5.52 ISMRE	AHRI 920
	Ground-water source	5.0 ISMRE	5.75 ISMRE	
	Water source	4.0 ISMRE	4.60 ISMRE	
Water-source heat pump (heating mode)	Ground source, closed loop	2.0 ISCOP	2.30 ISCOP	AHRI 920
	Ground-water source	3.2 ISCOP	3.68 ISCOP	
	Water source	3.5 ISCOP	4.03 ISCOP	

TABLE C403.3.2(13)

ELECTRICALLY OPERATED DX-DOAS UNITS, SINGLE-PACKAGE AND REMOTE CONDENSER, WITH ENERGY RECOVERY—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Air cooled (dehumidification mode)	—	5.2 ISMRE	5.98 ISMRE	AHRI 920
Air-source heat pumps (dehumidification mode)	—	5.2 ISMRE	5.98 ISMRE	AHRI 920
Water cooled (dehumidification mode)	Cooling tower condenser water	5.3 ISMRE	6.10 ISMRE	AHRI 920
	Chilled water	6.6 ISMRE	7.59 ISMRE	
Air-source heat pump (heating mode)	—	3.3 ISCOP	3.80 ISCOP	AHRI 920
Water-source heat pump (dehumidification mode)	Ground source, closed loop	5.2 ISMRE	5.98 ISMRE	AHRI 920
	Ground-water source	5.8 ISMRE	6.67 ISMRE	
	Water source	4.8 ISMRE	5.52 ISMRE	
Water-source heat pump (heating mode)	Ground source, closed loop	3.8 ISCOP	4.37 ISCOP	AHRI 920
	Ground-water source	4.0 ISCOP	4.60 ISCOP	
	Water source	4.8 ISCOP	5.52 ISCOP	

TABLE C403.3.2(14)
ELECTRICALLY OPERATED WATER-SOURCE HEAT PUMPS—MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY	TEST PROCEDURE
Water-to-air, water loop (cooling mode)	< 17,000 Btu/h	All	86°F entering water	12.2 EER	14.03 EER	ISO 13256-1
	≥ 17,000 Btu/h and < 65,000 Btu/h			13.0 EER	14.95 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h			13.0 EER	14.95 EER	
Water-to-air, ground water (cooling mode)	< 135,000 Btu/h	All	59°F entering water	18.0 EER	20.70 EER	ISO 13256-1
Brine-to-air, groundloop (cooling mode)	< 135,000 Btu/h	All	77°F entering water	14.1 EER	16.22 EER	ISO 13256-1
Water-to-water, water loop (coolingmode)	< 135,000 Btu/h	All	86°F entering water	10.6 EER	12.19 EER	ISO 13256-2
Water-to-water, ground water (cooling mode)	< 135,000 Btu/h	All	59°F entering water	16.3 EER	18.75 EER	ISO 13256-2
Brine-to-water, ground loop (coolingmode)	< 135,000 Btu/h	All	77°F entering water	12.1 EER	13.92 EER	ISO 13256-2
Water-to-water, water loop (heatingmode)	< 135,000 Btu/h (cooling capacity)	—	68°F entering water	4.3 COP _H	4.95 COP_H	ISO 13256-1
Water-to-air, ground water (heating mode)	< 135,000 Btu/h (cooling capacity)	—	50°F entering water	3.7 COP _H	4.26 COP_H	ISO 13256-1
Brine-to-air, groundloop (heating mode)	< 135,000 Btu/h (cooling capacity)	—	32°F entering water	3.2 COP _H	3.68 COP_H	ISO 13256-1
Water-to-water, water loop (heatingmode)	< 135,000 Btu/h (cooling capacity)	—	68°F entering water	3.7 COP _H	4.26 COP_H	ISO 13256-1
Water-to-water, ground water (heating mode)	< 135,000 Btu/h (cooling capacity)	—	50°F entering water	3.1 COP _H	3.57 COP_H	ISO 13256-2
Brine-to-water, ground loop (heatingmode)	< 135,000 Btu/h (cooling capacity)	—	32°F entering water	2.5 COP _H	2.88 COP_H	ISO 13256-2

TABLE C403.3.2(15)

HEAT-PUMP AND HEAT RECOVERY CHILLER PACKAGES—MINIMUM EFFICIENCY REQUIREMENTS

HEATING OPERATION								
EQUIPMENT TYPE	SIZE CATEGORY, ton	2021 IECC MINIMUM EFFICIENCY			GPC MINIMUM EFFICIENCY			Test Procedure
		COOLING-ONLY OPERATION COOLING EFFICIENCY AIR-SOURCE EER (FL/IPLV), Btu/W × h WATER-SOURCE POWER INPUT PER CAPACITY (FL/IPLV), kW/ton _R		HEATING SOURCE CONDITIONS (entering/ leaving water) OR OAT (db/wb), °F	COOLING-ONLY OPERATION COOLING EFFICIENCY AIR-SOURCE EER (FL/IPLV), Btu/W × h WATER-SOURCE POWER INPUT PERCAPACITY (FL/IPLV), kW/ton _R		HEATING SOURCE CONDITIONS (entering/ leavingwater) OR OAT (db/wb), °F	
		Path A	Path B		Path A	Path B		
Air source	All sizes	≥ 9.595 FL ≥ 13.02 IPLV.IP	≥ 9.215 FL ≥ 15.01 IPLV.IP	47 db 43 wb	11.03 14.97	10.59 17.26	54.05 db 49.45 wb	AHRI 550/590
		≥ 9.595 FL ≥ 13.30 IPLV.IP	≥ 9.215 FL ≥ 15.30 IPLV.IP	17 db 15 wb	11.03 15.29	10.59 17.59	19.55 db 17.25 wb	
Water-source electrically operated positive displacement	< 75	≤ 0.7885 FL ≤ 0.6316 IPLV.IP	≤ 0.7875 FL ≤ 0.5145 IPLV.IP	54/44 75/65	0.90 0.72	0.90 0.59	62.1/50.6 86.25/74.75	AHRI 550/590
		≥ 75 and < 150	≤ 0.7579 FL ≤ 0.5895 IPLV.IP	≤ 0.7140 FL ≤ 0.4620 IPLV.IP	54/44 75/65	0.87 0.67	0.82 0.53	
	≥ 150 and < 300	≤ 0.6947 FL ≤ 0.5684 IPLV.IP	≤ 0.7140 FL ≤ 0.4620 IPLV.IP	54/44 75/65	0.79 0.65	0.82 0.53	62.1/50.6 86.25/74.75	
		≥ 300 and < 600	≤ 0.6421 FL ≤ 0.5474 IPLV.IP	≤ 0.6563 FL ≤ 0.4305 IPLV.IP	54/44 75/65	0.73 0.62	0.75 0.49	
	≥ 600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6143 FL ≤ 0.3990 IPLV.IP	54/44 75/65	0.67 0.60	0.70 0.45	62.1/50.6 86.25/74.75	
		< 75	≤ 0.6421 FL ≤ 0.5789 IPLV.IP	≤ 0.7316 FL ≤ 0.4632 IPLV.IP	54/44 75/65	0.73 0.66	0.84 0.53	
	≥ 75 and < 150		≤ 0.5895 FL ≤ 0.5474 IPLV.IP	≤ 0.6684 FL ≤ 0.4211 IPLV.IP	54/44 75/65	0.67 0.62	0.76 0.48	
		≥ 150 and < 300	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6263 FL ≤ 0.4105 IPLV.IP	54/44 75/65	0.67 0.60	0.72 0.47	
	≥ 300 and < 600		≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6158 FL ≤ 0.4000 IPLV.IP	54/44 75/65	0.67 0.60	0.70 0.46	
		≥ 600	≤ 0.5895 FL ≤ 0.5263 IPLV.IP	≤ 0.6158 FL ≤ 0.4000 IPLV.IP	54/44 75/65	0.67 0.60	0.70 0.46	

TABLE C403.3.2(15)
HEAT-PUMP AND HEAT RECOVERY CHILLER PACKAGES—MINIMUM EFFICIENCY REQUIREMENTS (continued)

HEATING OPERATION																		
EQUIPMENT TYPE	SIZE CATEGORY, ton	2021 IECC MINIMUM EFFICIENCY								GPC MINIMUM EFFICIENCY								Test Procedure
		HEAT-PUMP HEATING FULL-LOAD EFFICIENCY (COP _H), W/W				HEAT RECOVERY CHILLER FULL-LOAD EFFICIENCY (COP _{HR}), W/W SIMULTANEOUS COOLING AND HEATING FULL-LOAD EFFICIENCY (COP _{SHC}), W/W				HEAT-PUMP HEATING FULL-LOAD EFFICIENCY (COP _H), W/W				HEAT RECOVERY CHILLER FULL-LOAD EFFICIENCY (COP _{HR}), W/W SIMULTANEOUS COOLING AND HEATING FULL-LOAD EFFICIENCY (COP _{SHC}), W/W				
		Leaving Heating Water Temperature				Leaving Heating Water Temperature				Leaving Heating Water Temperature				Leaving Heating Water Temperature				
		Low	Medium	High	Boost	Low	Medium	High	Boost	Low	Medium	High	Boost	Low	Medium	High	Boost	
		105°F	120°F	140°F	140°F	105°F	120°F	140°F	140°F	105°F	120°F	140°F	140°F	105°F	120°F	140°F	140°F	
Air source	All sizes	≥ 3.290	≥ 2.770	≥ 2.310	NA	NA	NA	NA	NA	≥ 3.78	≥ 3.18	≥ 2.65	NA	NA	NA	NA	NA	AHRI 550/590
		≥ 2.230	≥ 1.950	≥ 1.630	NA	NA	NA	NA	NA	≥ 2.56	≥ 2.24	≥ 1.87	NA	NA	NA	NA	NA	
Water-source electrically operated positive displacement	< 75	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	≥ 5.33	≥ 4.23	≥ 3.08	NA	≥ 9.57	≥ 7.37	≥ 5.08	NA	AHRI 550/590
		NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	NA	NA	NA	≥ 4.08	NA	NA	≥ NA	7.07	
	≥ 75 and < 150	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	≥ 5.33	≥ 4.23	≥ 3.08	NA	≥ 9.57	≥ 7.37	≥ 5.08	NA	
		NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	NA	NA	NA	≥ 4.08	NA	NA	NA	7.07	
	≥ 150 and < 300	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	≥ 5.33	≥ 4.23	≥ 3.08	NA	≥ 9.57	≥ 7.37	≥ 5.08	NA	
		NA	NA	NA	≥ 3.550	NA	NA	NA	6.150	NA	NA	NA	≥ 4.08	NA	NA	NA	7.07	
	≥ 300 and < 600	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	≥ 5.66	≥ 4.55	≥ 3.41	NA	≥ 10.23	≥ 8.02	≥ 5.75	NA	
		NA	NA	NA	≥ 3.900	NA	NA	NA	6.850	NA	NA	NA	≥ 4.48	NA	≥ NA	NA	7.87	
	≥ 600	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	≥ 5.66	≥ 4.55	≥ 3.41	NA	≥ 10.23	≥ 8.02	≥ 5.75	NA	
		NA	NA	NA	≥ 3.900	NA	NA	NA	6.850	NA	NA	NA	≥ 4.48	NA	NA	NA	7.87	

Water-source electrically operated centrifugal	< 75	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	≥ 5.33	≥ 4.23	≥ 3.08	NA	≥ 9.57	≥ 7.37	≥ 5.08	NA	AHRI 550/590				
		NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	NA	NA	NA	NA	≥ 4.08	NA	NA	NA		≥ 7.07			
	≥ 75 and < 150	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	≥ 5.33	≥ 4.23	≥ 3.08	NA	≥ 9.57	≥ 7.37	≥ 5.08	NA		AHRI 550/590			
		NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	NA	NA	NA	NA	≥ 4.08	NA	NA	NA			≥ 7.07		
	≥ 150 and < 300	≥ 4.640	≥ 3.680	≥ 2.680	NA	≥ 8.330	≥ 6.410	≥ 4.420	NA	≥ 5.33	≥ 4.23	≥ 3.08	NA	≥ 9.57	≥ 7.37	≥ 5.08	NA			AHRI 550/590		
		NA	NA	NA	≥ 3.550	NA	NA	NA	≥ 6.150	NA	NA	NA	NA	≥ 4.08	NA	NA	NA				≥ 7.07	
	≥ 300 and < 600	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	≥ 5.66	≥ 4.55	≥ 3.41	NA	≥ 10.23	≥ 8.02	≥ 5.75	NA				AHRI 550/590	
		NA	NA	NA	≥ 3.900	NA	NA	NA	≥ 6.850	NA	NA	NA	NA	≥ 4.48	NA	NA	NA					≥ 7.8775
	≥ 600	≥ 4.930	≥ 3.960	≥ 2.970	NA	≥ 8.900	≥ 6.980	≥ 5.000	NA	≥ 5.66	≥ 4.55	≥ 3.41	NA	≥ 10.23	≥ 8.02	≥ 5.75	NA					AHRI 550/590
		NA	NA	NA	≥ 3.900	NA	NA	NA	≥ 6.850	NA	NA	NA	NA	≥ 4.48	NA	NA	NA					

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**TABLE C403.3.2(16)
CEILING-MOUNTED COMPUTER-ROOM AIR CONDITIONERS—MINIMUM EFFICIENCY
REQUIREMENTS**

EQUIPMENT TYPE	STANDARD MODEL	NET SENSIBLE COOLING CAPACITY	2021 IECC MINIMUM EFFICIENCY		GPC MINIMUM EFFICIENCY		TEST PROCEDURE
			MINIMUM NET SENSIBLE COP	RATING CONDITIONS RETURN AIR (dry bulb/dew point)	MINIMUM NET SENSIBLE COP	RATING CONDITION SRETURN AIR (dry bulb/dew point)	
Air cooled with freeair discharge condenser	Ducted	< 29,000 Btu/h	2.05	75°F/52°F (Class 1)	2.357	75°F/52°F (Class 1)	AHRI 1360
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.02		2.32		
		≥ 65,000 Btu/h	1.92		2.20		
	Nonducted	< 29,000 Btu/h	2.08		2.39		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.05		2.357		
		≥ 65,000 Btu/h	1.94		2.23		
Air cooled with freeair discharge condenser with fluideconomizer	Ducted	< 29,000 Btu/h	2.01	75°F/52°F (Class 1)	2.31	75°F/52°F (Class 1)	AHRI 1360
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.97		2.26		
		≥ 65,000 Btu/h	1.87		2.15		
	Nonducted	< 29,000 Btu/h	2.04		2.34		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.00		2.30		
		≥ 65,000 Btu/h	1.89		2.17		
Air cooled with ducted condenser	Ducted	< 29,000 Btu/h	1.86	75°F/52°F (Class 1)	2.13	75°F/52°F (Class 1)	AHRI 1360
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.83		2.10		
		≥ 65,000 Btu/h	1.73		1.98		
	Nonducted	< 29,000 Btu/h	1.89		2.17		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.86		2.13		
		≥ 65,000 Btu/h	1.75		2.01		
Air cooled with fluid economizer and ducted condenser	Ducted	< 29,000 Btu/h	1.82	75°F/52°F (Class 1)	2.09	75°F/52°F (Class 1)	AHRI 1360
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.78		2.04		
		≥ 65,000 Btu/h	1.68		1.93		
	Nonducted	< 29,000 Btu/h	1.85		2.12		
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.81		2.08		
		≥ 65,000 Btu/h	1.70		1.95		
	Ducted	< 29,000 Btu/h	2.38		2.73		
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.28		2.62		

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Water cooled		≥ 65,000 Btu/h	2.18	75°F/52°F (Class 1)	2.50	75°F/52°F (Class 1)	AHRI 1360	
		Nonducted	< 29,000 Btu/h		2.41			2.77
			≥ 29,000 Btu/h and < 65,000 Btu/h		2.31			2.65
			≥ 65,000 Btu/h		2.20			2.53
Water cooled with fluid economizer	Ducted	< 29,000 Btu/h	2.33	75°F/52°F (Class 1)	2.67	75°F/52°F (Class 1)	AHRI 1360	
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.23		2.56			
		≥ 65,000 Btu/h	2.13		2.44			
	Nonducted	< 29,000 Btu/h	2.36		2.71			
		≥ 29,000 Btu/h and < 65,000 Btu/h	2.26		2.60			
		≥ 65,000 Btu/h	2.16		2.48			
Glycol cooled	Ducted	< 29,000 Btu/h	1.97	75°F/52°F (Class 1)	2.26	75°F/52°F (Class 1)	AHRI 1360	
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.93		2.21			
		≥ 65,000 Btu/h	1.78		2.04			
	Nonducted	< 29,000 Btu/h	2.00		2.30			
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.98		2.27			
		≥ 65,000 Btu/h	1.81		2.08			
Glycol cooled with fluid economizer	Ducted	< 29,000 Btu/h	1.92	75°F/52°F (Class 1)	2.20	75°F/52°F (Class 1)	AHRI 1360	
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.88		2.16			
		≥ 65,000 Btu/h	1.73		1.98			
	Nonducted	< 29,000 Btu/h	1.95		2.24			
		≥ 29,000 Btu/h and < 65,000 Btu/h	1.93		2.21			
		≥ 65,000 Btu/h	1.76		2.02			

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TABLE C403.3. MAXIMUM HOT GAS BYPASS CAPACITY

RATED CAPACITY	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY
	MAXIMUM HOT GAS BYPASS CAPACITY (% of total capacity)	MAXIMUM HOT GAS BYPASS CAPACITY (% of total capacity)
≤ 240,000 Btu/h	50	57.5
> 240,000 Btu/h	25	28.75

TABLE C403.3.4 BOILER TURNDOWN

BOILER SYSTEM DESIGN INPUT (Btu/h)	2021 IECC MINIMUM EFFICIENCY	GPC MINIMUM EFFICIENCY
	MINIMUM TURNDOWN RATIO	MINIMUM TURNDOWN RATIO
≥ 1,000,000 and ≤ 5,000,000	3 to 1	3.45 to 1.15
> 5,000,000 and ≤ 10,000,000	4 to 1	4.6 to 1.15
> 10,000,000	5 to 1	5.75 to 1.15